
SYSTEMATIC REVISION AND PHYLOGENY OF *AINSLIAEA* DC. (ASTERACEAE, MUTISIEAE)¹

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ABSTRACT

Ainsliaea DC. is an Asiatic genus of Mutisieae Cass. Forty-nine species and 19 varieties are recognized. Twenty-six species are endemic to China, four to Japan, four to Indo-China, two to the Himalayas, and one to Taiwan. The genus is characterized by its stems unbranched, with leaves basally rosulate or congested at the median part of the stem (only one species has stems branched, with alternate leaves), capitula few-flowered, florets deeply 5-cleft with unilateral lobes, and plumose pappus. Three new combinations are made: *Ainsliaea bonatii* Beauverd var. *multibracteata* (Mattf.) S. E. Freire, *A. glabra* Hemsl. var. *sutchuenensis* (Franch.) S. E. Freire, and *A. henryi* Diels var. *subalpina* (Hand.-Mazz.) S. E. Freire. One variety, *A. latifolia* (D. Don) Sch. Bip. var. *taiwanensis* S. E. Freire is described for the first time. The following taxa are newly synonymized: *A. macroclinidioides* Hayata var. *secundiflora* (Hayata) Kitam. and *A. secundiflora* Hayata with *A. apiculata* Sch. Bip. var. *acerifolia* Masam.; *A. aptera* DC. f. *paniculata* Kuntze with *A. aptera* DC.; *A. pteropoda* DC. var. *platyphylla* Franch. with *A. bonatii* Beauverd; *A. mattfeldiana* Hand.-Mazz. with *A. bonatii* var. *multibracteata*; *A. cleistogama* C. C. Chang with *A. cavaleriei* H. Lév.; *A. asarifolia* Hayata, *A. cordifolia* Franch. & Sav. var. *integrifolia* Maxim., *A. fragrans* Champ. ex Benth. var. *integrifolia* (Maxim.) Kitam., *A. integrifolia* (Maxim.) Makino, *A. ningpoensis* Matsuda, and *A. rubrifolia* Franch. with *A. fragrans* Champ. ex Benth.; *A. lancifolia* Franch. with *A. glabra* Hemsl.; *A. tenuicaulis* Mattf., *A. glabra* var. *tenuicaulis* (Mattf.) C. C. Chang, and *A. plantaginifolia* Mattf. with *A. glabra* Hemsl. var. *sutchuenensis* (Franch.) S. E. Freire; *A. angustifolia* Hook. f. & Thoms. ex C. B. Clarke with *A. glumacea* (Fr.) Sch. Bip.; *A. gracilis* Franch. var. *robusta* Diels with *A. grossedentata* Franch.; *A. morrisonicola* Hayata, *A. reflexa* Merr. var. *morrisonicola* (Hayata) Yamam., *A. henryi* Diels var. *ovatifolia* C. C. Chang, *A. reflexa* Merr. var. *nimborum* Hand.-Mazz., and *A. latifolia* (D. Don) Sch. Bip. var. *nimborum* (Hand.-Mazz.) Kitam. with *A. henryi* var. *subalpina*; *A. petelotii* Merr. with *A. hypoleuca* Diels ex H. Limpr.; *A. hui* Diels ex Mattf. with *A. kawakamii* Hayata; *A. heterantha* Hand.-Mazz. with *A. latifolia* (D. Don) Sch. Bip.; and *A. tonkinensis* Merr., *A. longipetiolata* Merr., and *A. reflexa* Merr. var. *lobbiana* Beauverd with *A. reflexa* Merr. Lectotypes are newly designated for *Ainsliaea* DC., *Ainsliaea* sect. *Aggregatae* Beauverd, *A. apiculata* Sch. Bip., *A. aptera* DC., *A. cordifolia* Franch. & Sav., *A. crassifolia* C. C. Chang, *A. dentata* Koidz., *A. dissecta* Franch. & Sav., *A. elegans* Hemsl., *A. elegans* var. *strigosa* Mattf., *A. fulripes* Jeffrey & W. W. Sm., *A. glabra* Hemsl., *A. hypoleuca* Diels ex H. Limpr., *A. macroclinidioides* Hayata, *A. multibracteata* Mattf., *A. ovalifolia* Vaniot, *A. pertyoides* Franch., *A. pertyoides* var. *albotomentosa* Beauverd, *A. pertyoides* var. *intermedia* Beauverd, *A. plantaginifolia* Mattf., *A. pteropoda* DC., *A. pteropoda* var. *macrocephala* Mattf., *A. pteropoda* var. *platyphylla* Franch., *A. pteropoda* var. *silhetensis* DC., *A. scabrida* Dunn, *A. tenuicaulis* Mattf., *A. yadismae* Koidz., and *Hieracium glumaceum* Fr. Neotypes are designated for *A. apiculata* Sch. Bip. var. *acerifolia* Masam., *A. apiculata* Sch. Bip. var. *ovatifolia* Masam., *A. cordifolia* Franch. & Sav. var. *integrifolia* Maxim., and *A. linearis* Makino. Epitypes are designated for *A. cordifolia* Franch. & Sav., *A. dissecta* Franch. & Sav., and *A. pteropoda* DC. Phylogenetic analysis of *Ainsliaea* based on 30 morphological characters produced three most parsimonious trees that support the monophyly of the genus. *Pertya* Sch. Bip., *Myriphnois* Bunge, and *Macroclinidium* Maxim. are the genera closest to *Ainsliaea*, and it is hypothesized that *Pertya* is ancestral to the latter three. *Ainsliaea* is distinguished from *Pertya*, *Macroclinidium*, and *Myriphnois* by its usually plumose pappus bristles (vs. scabrid pappus bristles in the other three genera). Phylogenetic analysis also supports the existence of two subgenera, i.e., *Ainsliaea* subg. *Ainsliaea*, with distinctly uniseriate pappus bristles, and the monospecific *Ainsliaea* subg. *Diaspananthus* (Miq.) Kitam. (*A. uniflora* Sch. Bip.) from Japan, characterized by its pappus of biseriate bristles. Phylogenetic resolution within subgenus *Ainsliaea* is weakly supported. However, the best supported resolution divides subgenus *Ainsliaea* into three subclades: two agree with two of three previously proposed sections, and the remaining basal third subclade is monospecific (*A. lancangensis* Y. Y. Qian). Two sections previously recognized, section *Ainsliaea* (= section *Scaposae* Beauverd including section *Frondosae* Beauverd) and section *Aggregatae* Beauverd, are tentatively proposed until more appropriate characters have been found. A key to the species of the genus is provided, as well as morphological descriptions, illustrations, and distribution maps.

Key words: *Ainsliaea*, Asia, Asteraceae, Compositae, Mutisieae, taxonomy.

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Ainsliaea DC. is an Asiatic genus of 49 species ranging from Afghanistan to Japan in warm temperate forests. The genus consists of three morphologically distinct assemblages: (1) one shrubby species; (2) 36 species of perennial herbs with leaves clustered at the base; and (3) 12 species, also perennial herbs but with leaves falsely verticillate at the lower half of the stem. Since the genus was proposed by de Candolle (1838), its only taxonomic treatment was carried out by Beauverd (1909) and included 33 species. Nevertheless, *Ainsliaea* was treated in regional works or floral treatments, such as Hooker (1881) for the Himalayas; Lévillé (1914, 1915), Institute of Beijing (1987), and Tseng (1996) for China; Kitamura (1965), Numata and Asano (1969), Hatusima (1975), Makino (1989), and Kitamura et al. (1998) for Japan; Ho (1993) for Vietnam; Hayata (1919) and Peng et al. (1998) for Taiwan; and Lee (1980) for Korea. These authors delimited *Ainsliaea* principally by its plumose pappus, few-flowered capitula, and florets deeply 5-cleft.

Ainsliaea differs from its most closely related genera, *Macroclinidium* Maxim., *Myriopholis* Bunge, and *Pertya* Sch. Bip., in having plumose pappus bristles (vs. scabrid pappus bristles in the other three genera). All four genera were recognized by Panero and Funk (2002) as the tribe Pertyeae and subfamily Pertyoideae on the basis of molecular studies.

The present taxonomic treatment revises *Ainsliaea* considering morphological characters, habit, and distribution, with special reference to test the monophyly of the genus and to establish the relationships of its species. The present study also fully describes all species, evaluates their relationships, and provides, in several cases the first, illustrations of the species.

TAXONOMIC HISTORY

Ainsliaea was established by de Candolle (1838) as a new name for *Liatris* sensu D. Don (1825: 169) non *Liatris* Gaertn. ex Schreb., within the tribe Eupatorieae. De Candolle placed *Ainsliaea* in his "Mutisiaceae" (1838: 13), noting that this new genus and *Liatris* Gaertn. ex Schreb. have characters in common, e.g., rosulate habit, capitula homogamous, and pappus plumose, and *Ainsliaea* was distinguished by the anthers calcarate, caudate, with oblong apical appendages, and style branches shortly bilobed. De Candolle described two species and one variety, *A. pteropoda* and *A. aptera* both from Nepal, and *A. pteropoda* var. *silhetensis* from India. The only species described by D. Don under *Liatris*, i.e., *L. latifolia*, was referred by de Candolle as a synonym of *A. pteropoda* and later transferred to *Ainsliaea* by Schultz Bipontinus (1861: 190). The generic name honors Whitelaw Ainslie (1767–1836).

Botanists of different nationalities have contributed to the understanding of the genus. European botanical exploration in the 1800s led to the discovery of the first Chinese, Indo-Chinese, and Japanese species. Between 1852 and 1895, 22 species and six infraspecific taxa were described by British (*Ainsliea angustifolia* Hook. f. & Thoms. ex C. B. Clarke, *A. fragrans* Champ. ex Benth., *A. glabra* Hemsl., *A. ramosa* Hemsl., *A. walkeri* Hook. f.), German (*A. acerifolia* Sch. Bip., *A. apiculata* Sch. Bip., *A. aptera* DC. f. *paniculata* Kuntze, *A. asperrima* (D. Don) Sch. Bip., *A. brandisiana* Kurz, *A. glumacea* (Fr.) Sch. Bip., *A. uniflora* Sch. Bip.), French (*A. affinis* Miq., *A. apiculata* Sch. Bip. var. *minor* Miq., *A. cordifolia* Franch. & Sav., *A. dissecta* Franch. & Sav., *A. gracilis* Franch., *A. grossedentata* Franch., *A. lancifolia* Franch., *A. nervosa* Franch., *A. pertyoides* Franch., *A. pteropoda* DC. var. *leiophylla* Franch., *A. pteropoda* DC. var. *obovata* Franch., *A. pteropoda* DC. var. *platyphylla* Franch., *A. rubrifolia* Franch., *A. sutchuenensis* Franch., *A. yunnanensis* Franch.), and Russian (*A. cordifolia* Franch. & Sav. var. *integrifolia* Maxim.) botanists.

In the early twentieth century, seven species and one variety were added from China (*Ainsliaea henryi* Diels, *A. undulata* Diels, *A. gracilis* Franch. var. *robusta* Diels, *A. elegans* Hemsl., *A. ovalifolia* Vaniot, *A. sparsiflora* Vaniot, *A. spicata* Vaniot, and *A. scabrida* Dunn), one from the Philippines (*A. reflexa* Merr.), and one from Taiwan (*A. macroclinidioides* Hayata).

Beauverd (1909) described three new species and four varieties, *Ainsliaea fauriana* and *A. liukiensis* from Japan, and *A. bonatii*, *A. bonatii* var. *glabra*, *A. bonatii* var. *arachnoidea*, *A. pertyoides* var. *albomentosa*, and *A. pertyoides* var. *intermedia* from China. His treatment included 33 species. Based on plant habit, Beauverd established three sections in *Ainsliaea*: (1) *Frondosae*: *Ainsliaea pertyoides*, (2) *Scaposae*: *Ainsliaea angustifolia* (= *A. glumacea*), *A. aptera*, *A. asperrima*, *A. bonatii*, *A. brandisiana*, *A. elegans*, *A. fragrans*, *A. henryi*, *A. lancifolia* (= *A. glabra*), *A. pteropoda* (= *A. latifolia*), *A. ramosa*, *A. reflexa*, *A. rubrifolia* (= *A. fragrans*), *A. scabrida* (= *A. yunnanensis*), *A. spicata*, *A. sutchuenensis* (= *A. glabra* Hemsl. var. *sutchuenensis* (Franch.) S. E. Freire), *A. undulata* (= *A. henryi*), *A. yunnanensis*, and (3) *Aggregatae*: *Ainsliaea acerifolia*, *A. apiculata*, *A. cordifolia*, *A. dissecta*, *A. fauriana* (= *A. linearis* Makino), *A. glabra*, *A. gracilis*, *A. grossedentata*, *A. hayatae* H. Lév. (= *A. henryi* Diels var. *subalpina* (Hand.-Mazz.) S. E. Freire), *A. integrifolia* (Maxim.) Makino (= *A. fragrans*), *A. liukiensis* (= *A. apiculata* Sch. Bip. var. *acerifolia* Masam.), *A. nervosa*, *A. uniflora*, *A. walkeri*. Since Beauverd's monograph of

Ainsliaea, the number of valid names (excluding new names and new combinations) assigned to the genus has increased to 109, with 80 species and 29 infraespecific taxa recognized. Much of the increase may be attributed to taxa described by Chinese and Japanese botanists.

Kitamura (1938) transferred the monotypic genus *Diaspananthus* Miq. to *Ainsliaea*, and delimited two subgenera: (1) *Diaspananthus*, characterized by one-flowered capitula; and (2) *Eu-Ainsliaea* (= *Ainsliaea*) including two sections, sect. *Scaposae* and sect. *Aggregatae*.

Sugimoto (1957), in naming *Ainsliaea* $\times$ *hybrida*, was the only botanist to suggest hybridization in the genus.

MATERIALS AND METHODS

HERBARIUM SPECIMENS

Loans of *Ainsliaea* from the following herbaria were examined: A, AAU, BKF, BM, CAL, CANB, CM, DAO, E, G, GH, HAST, HITBC, K, KUN, KYO, L, M, MAK, MICH, MO, NY, O, P, PE, PENN, PH, S, SMAO, TI, UC, US, W, WU (Holmgren et al., 1990; Appendices 1, 2). A list of specimens examined for the outgroup taxa is provided in Appendix 3. An index/list to scientific names mentioned in this article is provided in Appendix 4.

MORPHOLOGICAL ANALYSIS

Leaf trichomes were studied in samples cleared using the technique of Dizeo de Strittmatter (1973) and stained with 2% safranin. Descriptive terminology for the trichomes follows Ramayya (1962). Leaf descriptions were made utilizing the terminology of Harris and Harris (1994).

PHYLOGENETIC ANALYSIS

Characters. Twenty-nine morphological characters were used in the cladistic analysis; 14 characters are multistate and were treated as unordered. Twenty-four of the 29 characters were qualitative. Characters and their states used in the analyses are described in Table 1. Autapomorphies are not included unless they form one of the states in a multistate character. The data matrix is shown in Table 2.

Computer programs. Analyses using implied weights (Goloboff, 1993) were run in PeeWee ver. 3 (Goloboff, 1998). All analyses were run using the default settings amb- and poly= (polytomies allowed). The following search strategy was applied to all data sets: "hold 10000: rseed 0; hold/40; poly=: amb-:

mult*500; max*; swap*." Five hundred subsearches were performed each constructing the initial tree with tree bisection and reconnection (TBR) and retaining a maximum of 40 trees in each replicate (hold/40, mult*500). The resulting trees were swapped using TBR swapping cutting two sister nodes simultaneously. The default option "ambs" retained only nodes that are supported by unambiguous optimizations, while poly= treats trees as polytomous. A medium concave function, k = 3, was used.

Jackknife frequency values (Farris et al., 1996) based on Wagner trees were calculated using the available instruction file NONA, the Jak-run file.

Ingroup and outgroup selection. The ingroup contains 39 species of the total 49 recognized for *Ainsliaea*. Taxa with similar characters have been entered as a single taxon in the data matrix (safe deletion rules, Wilkinson, 1995). Therefore, the following groups, *A. cavaleriei* H. Lév.-*A. ramosa*-*A. rubrinervis* C. C. Chang, *A. bonatii*-*A. smithii* Mattf., *A. reflexa*-*A. henryi*, *A. glabra*-*A. nervosa*, *A. linearis*-*A. walkeri*, *A. brandisiana*-*A. spanocephala* Y. C. Tseng, are represented as *A. cavaleriei*, *A. bonatii*, *A. reflexa*, *A. glabra*, *A. linearis*, and *A. spanocephala*, respectively.

Ainsliaea crassifolia C. C. Chang, *A. nana* T. C. Tseng, and *A. paucicapitata* Hayata were omitted from analysis because they are only known from the original description and, consequently, too many characters are missing.

Pertya, *Myriopsis*, and *Macroclinidium* were represented by *Pertya ovata* Maxim., *Myriopsis dioica* Bunge, and *Macroclinidium robustum* Maxim., respectively, as outgroups in the present study because they share with *Ainsliaea* corollas deeply 5-lobed with unilateral lobes (unique character within the Mutisieae). *Macroclinidium*, which is endemic to Japan, may be regarded as the sister group of *Ainsliaea* due to its leaves congested at the median part of the stem and its herbaceous habit. *Pertya*, which is endemic to the Sino-Japanese region, is characterized by its shrubby habit and branched stems with leaves alternate (or nested on brachyblasts, which also occurs in the monotypic *Myriopsis* from China) and was used for the purpose of rooting the trees in analysis. Characters delimiting the species of *Pertya* and *Macroclinidium* are autapomorphies and are therefore disregarded.

RESULTS

MORPHOLOGICAL ANALYSIS

Habit. The differences in habit displayed by *Ainsliaea* species basically correlate with the infrageneric classification followed in this treatment.

Table 1. Morphological characters used in phylogenetic analysis of *Ainsliaea*.

Habit	
1. Shrub or subshrub (0), perennial herb (1)	
2. Stem branched (0), simple (1)	
Leaves	
3. Arrangement alternate (0), pseudoverticillate or clustered above stem base (1), as basal rosette (2), clustered from brachyblast (3)	
4. Blade shape ovate (0), deltoid, ovate to deltoid or reniform (1), obovate or pandurate (2), elliptic or oblong to elliptic (3), lanceolate (4), linear, linear to elliptic, or linear to obovate (5)	
5. Blade margin entire to obscurely denticulate (0), denticulate (1), dentate (2), palmatilobed or palmatifid (3), dissected (4)	
6. Blade base rounded (0), attenuate (1), cuneate (2), cordate or cordate to sagittate (3)	
7. Blade apex acute (0), acuminate (1), obtuse (2), rounded (3)	
8. Texture chartaceous (0), coriaceous (1), membranous (2), slightly fleshy (3)	
9. Leaf color slightly discolorous (0), distinctly discolored (1)	
10. Abaxial blade surface strigose (0), glabrate to glabrous (1), sericeous (2), strigose to lanate or sparsely lanate (3)	
11. Glandular trichomes absent (0), present (1)	
12. Trichomes T-shaped (0), straight, type A (1), straight, type B (2), straight and triseriate (3), crisped (4)	
13. Petiole length to 10 mm (0), more than 4 cm (1)	
14. Petiole winged (0), wingless (1)	
15. Petiole pubescence glabrate or scattered strigose (0), densely strigose (1)	
Capitula	
16. Arrangement solitary or 3 to 8 and all terminal (0), thyrsoïd (1), stachyoid (2)	
17. Peduncle ebracteate (0), bracteate (1)	
18. Involucre 12–18 mm high (0), less than 10 mm high (1)	
19. Phyllary 3- to 5-nerved (0), 1-nerved, with only midvein (1)	
20. Phyllary apex acute (0), acuminate (1), obtuse or rounded (2)	
21. Phyllary pubescence glabrous or glabrate (0), pilose (1), ciliate (2)	
Florets	
22. Floret number 5 (0), 6 or 7 or more (1), 3 or 4 (2), 1 or 2 (3)	
23. Apical anther appendages apiculate or acute (0), rounded or truncate (1), emarginate (2)	
24. Anther tails shortly pilose or pilose (0), smooth to slightly pilose (1)	
25. Style branches truncate or rounded (0), acute or obtuse (1)	
26. Pappus scabrose (0), plumose (1)	
27. Pappus 65 to 100 bristles (0), 55 bristles (1), 30 to 40 bristles (2)	
28. Pappus variable in length and width (0), similar in length and width (1)	
29. Achene pubescence pilose (0), apically pilose (1), glabrous (2)	

The genus contains 12 perennial herbs with leaves congested at midpoint (belonging to section *Aggregatae*) and 36 scapose perennial herbs with rosulate leaves or with leaves approximated above the base (most of them belonging to section *Ainsliaea*). There is only one shrub species, with leaves alternate on long branchlets in the upper part (*A. pertyoides*).

Pubescence. Pubescence in *Ainsliaea* species consists of six basic trichome types. The type of pubescence is often useful alone or in combination with other characters in distinguishing species and subspecies, e.g., *A. brandisiana*, *A. elegans*, *A. spanocephala*, *A. yunnanensis*. Six basic types are as follows (the first five present on stems, leaves, and phyllaries, and the sixth restricted to the achenes):

1. *T-shaped, multistoried trichomes* (Fig. 1A). This type of trichome generally varies from 2.5–4 mm long,

consisting of a uniseriate pedestal of two or three somewhat squared cells and usually three or four long apical cells transversely elongated. The apical cells are shaped as in T-shaped trichomes, but with the distinction of having many cap cells. Considering the cellular development of the apical part, these trichomes can be slightly symmetrical (*Ainsliaea yunnanensis*) if the apical cells develop in two directions or asymmetrical (*A. macrocephala* (Mattf.) Y. C. Yseng, *A. mairei* H. Lév.) when the apical cells develop more in one direction than the other. Koyama (1975) referred to these trichomes as type B, occurring in some species of *Pertya*, e.g., *P. ovata*.

2. *Long straight, uniseriate trichomes* (Fig. 1B–E). This type of trichome generally varies from 0.7–3 mm long, consisting of a uniseriate pedestal of somewhat squared cells and long apical cells obliquely septate. Usually the apical part appears somewhat slanted due to horizontal growth exceeding

Table 2. Data matrix in the cladistic analysis. Polymorphic character states are scored as A = [01]; B = [02]; C = [03]; D = [12]; E = [14]; F = [23]; G = [24]; H = [013]. Data inapplicable to a taxon are represented by dashes.

Character	1	2	
	1234567890	1234567890	123456789
<i>Pertya ovata</i>	0000000000	000000-000	010000000
<i>Myriopsis dioica</i>	0034010001	0-0-00-100	110010000
<i>Macroclinidium robustum</i>	1110221001	0111020012	010010000
<i>Ainsliaea acerifolia</i>	111-33-001	0211021002	020001212
<i>A. angustata</i>	1123010100	0111110100	120101210
<i>A. apiculata</i>	111-3CB000	0211021000	021001210
<i>A. aptera</i>	1121231000	11110D0000	121001210
<i>A. apteroides</i>	1120131003	1E11021010	021001210
<i>A. bonatii</i>	1121130003	1E10020110	121101210
<i>A. brandisiana</i>	1123032000	1311110101	100001210
<i>A. caesia</i>	1124000000	0101020100	021001212
<i>A. cavaleriei</i>	1120030000	0111110101	120001210
<i>A. chapaensis</i>	1120000100	1111020100	121001210
<i>A. cordifolia</i>	111-332000	0211021100	120111212
<i>A. dissecta</i>	111-43-201	0211021100	020111212
<i>A. elegans</i>	11210301AC	0E11110010	131001210
<i>A. foliosa</i>	111310000C	1G10020110	020001210
<i>A. fragrans</i>	1110030110	0111120101	022001211
<i>A. fulvipes</i>	1123002100	0111120110	121001210
<i>A. glabra</i>	1120121301	1211010110	02100121A
<i>A. glumacea</i>	1122110300	110--10111	021101210
<i>A. gracilis</i>	1110001000	0211021100	021001211
<i>A. grossedentata</i>	1110200000	0211021102	121011212
<i>A. henryi</i>	11200D0200	011A020111	1F100121D
<i>A. hypoleuca</i>	1120000013	0E10020111	121001210
<i>A. kawakamii</i>	11D0002001	0211010100	021001211
<i>A. lancangensis</i>	111-331000	1211010002	130001210
<i>A. latifolia</i>	112000000H	1E100D0110	121001210
<i>A. linearis</i>	1115110001	0210011102	0B2001210
<i>A. macrocephala</i>	1120000302	0010020011	121101110
<i>A. macroclinidioides</i>	111A231000	0211021100	021001210
<i>A. mairei</i>	1122010002	000--20110	121101210
<i>A. nervosa</i>	1125010101	1211010110	121001210
<i>A. oblonga</i>	1114D1A000	0211011100	021001210
<i>A. parvifolia</i>	1120120100	0111021100	021101211
<i>A. pentaflora</i>	1120020000	0111010010	101001210
<i>A. pertyoides</i>	000000110C	0E01000010	121001210
<i>A. pingbianensis</i>	1123002100	0111110101	120101210
<i>A. qianiana</i>	1123000301	0110020011	020001210
<i>A. ramosa</i>	1120030100	0111110101	020101210
<i>A. reflexa</i>	1120020201	011A020111	021001210
<i>A. rubrinervis</i>	1120030110	0111120101	020001210
<i>A. smithii</i>	11?1131003	1410010111	021101210
<i>A. spanocephala</i>	1123000100	1311110000	100001210
<i>A. spicata</i>	112200200C	0E01020110	021001210
<i>A. trinervis</i>	1114111001	0211010100	122001210
<i>A. uniflora</i>	112-33-000	0211010100	030011010
<i>A. walkeri</i>	1115110001	0?10011100	022001210
<i>A. yunnanensis</i>	1120120100	1011020010	021101210

the vertical. These trichomes are found in nearly all species of *Ainsliaea*. The cells of the apical part of these trichomes may be either slightly thicker (Fig. 1B–D; most species of section *Ainsliaea*) or thinner than those of the basal part (Fig. 1E; e.g., most species of *Ainsliaea* sect. *Aggregatae*). Koyama (1975) referred to these trichomes as type D and E, respectively, occurring in species of *Pertya*, e.g., *P.*

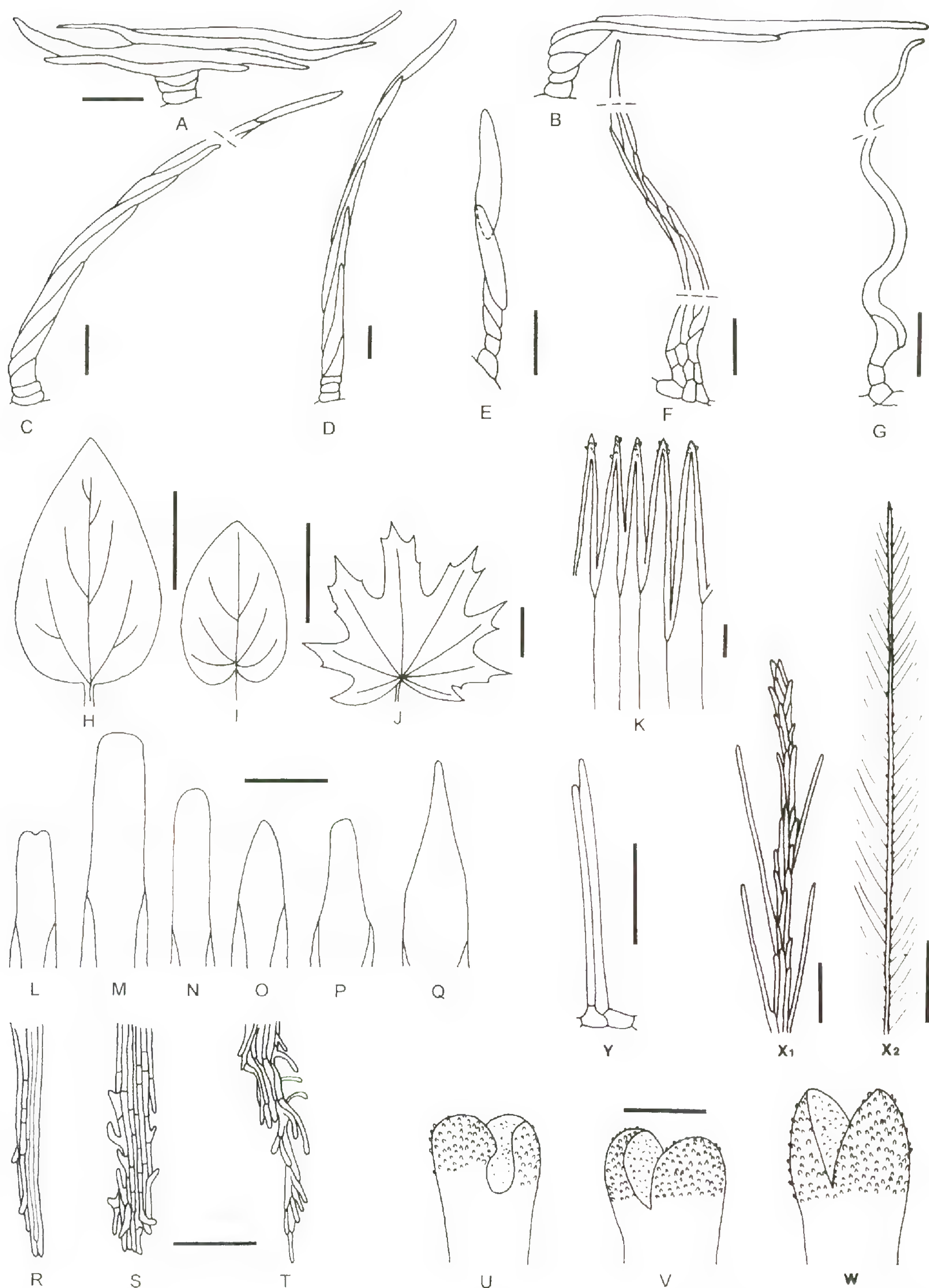


Figure 1. A–G. Foliar trichomes of *Ainsliaea*. —A. T-shaped trichome (*A. yunnanensis*, Delarav 608, NY); —B–E. Straight trichomes. B–D: type A; E: type B (B. *A. chapaensis*, Pételot 2068, MO; C. *A. pertyoides*, Delarav in 1883, UC; D. *A. pingbianensis*, S. Q. Chen 15094, MO; E. *A. lancangensis*, Y. Y. Qian 3343, SMAO). —F. Straight multiserial trichome (*A. brandisiana*, Kurz 865, G). —G. Crisped trichome (*A. bonatii*, Ducloux 3646, NY). H–J. Leaf venation of *Ainsliaea*. —H. Palmate-pinnate, 3-nerved (*A. latifolia*, Biskam 43, UC). —I. Palmate-pinnate, 5-nerved (*A. cavaleriei*, Steward & Cheo 1090, S). —J. Palmate (*A. acerifolia*, Maximowicz in 1863, MO). —K. Corolla venation of chasmogamous floret of *Ainsliaea* (*A. aptera*, Maser 118, US). L–Q. Apical anther appendages of *Ainsliaea*. —L. Emarginate (*A. walkeri*, Ching 3216, MO). —M, N. Rounded to truncate (M. *A. macrocephala*, Handel-Mazzetti 3619, W; N. *A. macroclinidioides*, Tashiro in 1924, KYO). —O. Acute (*A. foliosa*, HITBC 071881). —P, Q. Apiculate (P. *A. uniflora*, Maximowicz in 1863, S; Q. *A. cordifolia*, Furuse in Oct 1956, S). R–T. Anther tails of *Ainsliaea*. —R. Smooth to shortly pilose (*A. macrocephala*, Handel-Mazzetti 3619, W). —S.

hossei Craib. ex Hoss. (Koyama's type D with thick cells) and *P. glabrescens* Sch. Bip. (Koyama's type E with thin cells).

3. *Long crisped trichomes* (Fig. 1G). This type of trichome consists of one to three (occasionally five) basal cells and one long, twisted, and thin-walled, apical cell that is obliquely septate. They always occur intermixed with long straight trichomes, e.g., in *Ainsliaea hypoleuca* Diels ex H. Limpr., *A. pertyoides* var. *albotomentosa*, *A. spicata*, or with glandular trichomes, e.g., in *A. crassifolia*, *A. foliosa* Hand.-Mazz., *A. smithii*, or with both, e.g., in *A. apteroides* (C. C. Chang) Y. C. Tseng, *A. bonatii*, *A. latifolia*. Trichomes of this type were described by Ramayya (1962) as flagellate septate oblique, and they belong to type C according to Koyama (1975).

4. *Long straight, multiseriate trichomes* (Fig. 1F). This type of trichome generally varies from 0.7–0.8 mm long, consisting of a triseriate pedestal of square cells, and the apical portion also triseriate, of long cells obliquely septate. Trichomes of this type only occur in two species of *Ainsliaea* (*A. brandisiana* and *A. spanocephala* from Burma and Thailand, respectively).

5. *Capitate and clavate-tipped glandular trichomes*. These trichomes are found in the phyllaries, e.g., *Ainsliaea brandisiana*, *A. glumacea*, *A. nervosa*, *A. spanocephala*, and in leaves intermixed with other types of trichomes. These trichomes vary from clavate, biseriate, e.g., *A. aptera*, *A. foliosa*, *A. latifolia*, to conspicuously capitate, uniseriate (*A. apteroides*, *A. crassifolia*, *A. lancangensis* Y. Y. Qian, *A. yunnanensis*) or biseriate (*A. bonatii*, *A. chapaensis* Merr., *A. glabra*, *A. nervosa*, *A. smithii*).

6. *Twin hairs or duplex hairs* (Fig. 1Y). These trichomes are restricted to the achenes. These are found in nearly all species of *Ainsliaea* (except *A. acerifolia*, *A. caesia* Hand.-Mazz., *A. cordifolia*, *A. dissecta*, *A. henryi*, *A. gracilis*, *A. grossedentata*, and *A. nana*). They consist, in all species of *Ainsliaea*, of two small, square basal cells and two long apical cells acute at the apex, differing in length.

The cell structure of the long straight and T-shaped trichomes seems closely related, as was pointed out by Koyama (1975). In fact, this author suggested that the trichomes of *Ainsliaea yunnanensis* (T-shaped or type

B) have the same pattern of those of *A. pertyoides* (long straight or type D), where the cells of the apical portion develop horizontally in two directions or in one direction, respectively. The long straight triseriate trichome may be considered to be a variant of the long straight uniseriate trichome.

Leaves. Leaf characters are highly useful in distinguishing species in *Ainsliaea*. They are commonly long-petiolate (sessile in *A. glumacea* and *A. mairei* or short-petiolate in *A. caesia*, *A. pertyoides*, *A. spicata*), with petioles winged (*A. latifolia*, *A. bonatii*, *A. hypoleuca*) or wingless (*A. acerifolia*, *A. fragrans*, *A. lancangensis*, *A. pingbianensis* Y. C. Tseng). In most species of the genus, the leaf blades are entire (only *A. acerifolia*, *A. apiculata*, *A. cordifolia*, *A. dissecta*, *A. lancangensis*, and *A. uniflora* have dissected or lobed leaf blades), with margins denticulate-mucronate to dentate-mucronate. The leaf shape varies from ovate in the majority of species (*A. cavaleriei*, *A. elegans*, *A. fragrans*, *A. latifolia*) to elliptic (*A. angustata* C. C. Chang, *A. spanocephala*), linear (*A. linearis*), obovate (*A. spicata*), linear-obovate (*A. glumacea*), deltoid (*A. aptera*, *A. macroclinidioides*), or sub-rounded (*A. acerifolia*, *A. crassifolia*, *A. lancangensis*, *A. uniflora*). The base of leaf blades may be rounded (*A. chapaensis*, *A. pingbianensis*), cordate (*A. cordifolia*, *A. elegans*), or attenuate (*A. glabra*, *A. glumacea*).

In most species of the genus, the venation is palmate-pinnate (Melville, 1976), 3- or 5-veined (Fig. 1H, I). This venation is intermediate between palmate and pinnate, with the distal part of the leaf pinnate and a basal pair (or two pairs) of major veins palmate. In the species with leaf blades palmatilobed or palmatiparted, the venation is palmate (rectipalmate, Melville, 1976; actinodromous, Hickey, 1973), with three, five, seven, or nine primary veins straight or nearly so, which radiate from a basal node (Fig. 1J).

Synflorescence (Capitulescence). The synflorescence in *Ainsliaea* is monotelic (Weberling, 1985). The axis of the synflorescence ends in a terminal capitulum, and lower floral branches (paracladia) also end in terminal capitula. Thyrsoid and stachyoid synflorescences (Troll, 1964–1969; Weberling, 1985; Rua, 1999) prevail by far (Fig. 2).

←

Shortly pilose (*A. fragrans*, Tsang 20812, S). —T. Pilose (*A. uniflora*, Maximowicz in 1863, S). U–W. Style branches of *Ainsliaea*. —U. Truncate (*A. elegans*, Henry 10891, MO). —V. Rounded (*A. aptera*, Maser 118, US). —W. Obtuse to acute (*A. cordifolia*, Furuse in Oct 1956, S). X₁–X₂. Pappus of *Ainsliaea* (*A. gracilis*, Farges 1034A, P). —X₁. Upper part of the bristle pappus. —X₂. Bristle pappus. —Y. Achene trichome (*A. macroclinidioides*, Tashiro in 1924, KYO). Scale bars: A–D, F, X₁, Y = 0.1 mm; E, G = 0.05 mm; H–J = 3 cm; K = 1 mm; L–W = 0.5 mm; X₂ = 1.5 mm.

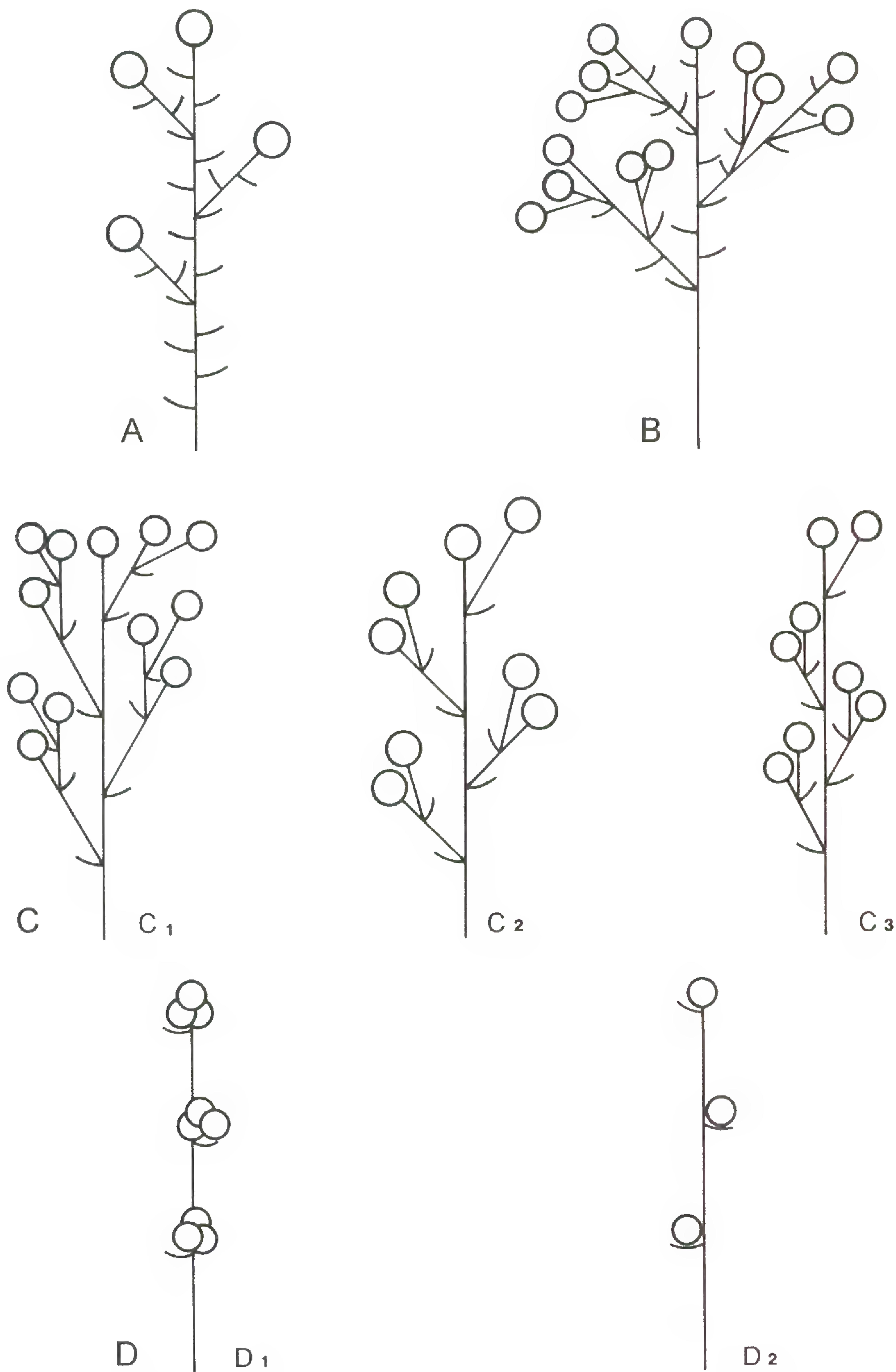


Figure 2. Synflorescences of *Pertya* and *Ainsliaea*. —A. Monotelic botryoid with leafy paracladia (*Pertya*). —B. Monotelic thyrsoid with leafy paracladia (*A. pertyoides*). —C. Monotelic thyrsoid with monochoasial paracladia (C₁. *A. angustata*, *A. caraleriei*, *A. elegans*, *A. glabra*, *A. glumacea*, *A. lancangensis*, *A. pingbianensis*, *A. ramosa*, *A. uniflora*, *A. smithii*. C₂. *A. brandisiana*, *A. pentaflora*, *A. spanocephala*. C₃. *A. linearis*, *A. nervosa*, *A. oblonga*, *A. trinervis*, *A. walkeri*). —D. Monotelic stachyoid (D₁. Capitula 3- to 5-fasciculate (three capitula shown): *A. acerifolia*, *A. apiculata*, *A. aptera*, *A. bonatii*, *A.*

The closely related genus *Pertya* also has monotelic synflorescences in which lateral and leafy floral shoots are produced from the axils of foliage leaves (Fig. 2A). Thus, these lateral floral shoots, present in *Pertya*, could be interpreted as the first step of a transition (the increase in number and the reduction of foliage leaves into bracts) to the branched system in *Ainsliaea*. In this view, the synflorescence of *A. pertyoides* (Fig. 2B), with leafy paracladia and capitula situated in the axils of foliage leaves, is regarded as the most primitive form of the synflorescence in *Ainsliaea*.

In *Ainsliaea* the main axis and lower paracladia have monochasial structure (Fig. 2C). By reduction of the capitula-bearing axis and its ramification, stachyoid inflorescences (cauliflory) occur (Fig. 2D).

Capitula. The capitula arranged laterally on the branches are peculiar in the species of the genus. Furthermore, at anthesis, the capitula with chasmogamous florets (*Ainsliaea acerifolia*, *A. cordifolia*, *A. dissecta*, *A. macrocephala*) are usually nodding. The adaptative significance of this morphology could be, following Sklenář (1999) who studied nodding capitula in Asteraceae, to protect the flowers from snow and rain as well as to attract insect pollinators due to temperatures warmer than other parts of the plant and the surrounding air.

Florets. In the genus *Ainsliaea*, florets on a capitulum are all hermaphroditic and isomorphic. They may be chasmogamous or cleistogamous. In fact, plants of *Ainsliaea* usually display a type of capitular dimorphism producing open heads consisting of chasmogamous florets as well as capitula of cleistogamous florets with involucre that remain completely closed until the mature achenes are released. Cleistogamous florets in *Ainsliaea* appear structurally modified for autogamy, i.e., the floret never opens (obligately self-pollinated), with the corolla tubular to pseudoligulate (one deeper slit but without expanded limb), stamens and styles much reduced in size, and fertile achenes larger than chasmogamous ones. Chasmogamous florets are adapted to xenogamy, i.e., the floret opens (to potentially cross-pollinate), with corollas ligulate (one deeper slit and lobes unilateral and reflexed),

stamens and styles developed, and smaller, sometimes flat, and sterile achenes. These two types of florets may occur simultaneously on one individual (in some specimens of *A. fragrans*, *A. reflexa*) or occur separate in time (*A. pingbianensis*), i.e., chasmogamous florets are produced in warm months (usually May to August) and cleistogamous florets in colder months (usually September to January) (pers. obs.). In contrast, a few species such as *A. cavaleriei* and *A. elegans* have florets always cleistogamous or only chasmogamous, respectively, in warm as well cold seasons.

Chaptalia Vent. and *Leibnitzia* Cass. are two other genera of Asteraceae from which cleistogamous capitula have been reported (Burkart, 1944; Vuilleumier, 1969; Nesom, 1983). From an ecological perspective, cleistogamy is regarded as a dimorphic strategy (Lloyd, 1984; Schoen & Lloyd, 1984; Plitmann, 1995) where cleistogamous flowering is favored under adverse and stressful conditions when pollinators and resources are likely to be scarce (Schemske, 1978; Lord, 1981; Campbell et al., 1983).

Corollas. In all species of *Ainsliaea*, the corollas are white or pink, glabrous and papillose only in the upper part of the lobes. Venation in all tubular-pseudoligulate and ligulate corollas corresponds to a discoid type (Koch, 1930a, b) in which there are five vascular traces at the base (Fig. 1K). Each of these is formed by the fusion of adjacent marginal bundles of the connate petals. The traces run upward through the corolla and separate into constituent branches, just below the sinuses of the corolla lobes. The marginal bundles of each lobe unite at its apex. In *Ainsliaea*, five fused lateral bundles divide at different levels, resulting in lobes unequal in length. One of the slits is much longer than the others. Similar corolla venation is present in the genus *Cnicus* L. of the tribe Cardueae (Manilal, 1971).

Anthers. In species with chasmogamous florets, the anthers are exserted and usually purple. In species with cleistogamous florets, the anthers are shorter than the corolla. Anthers in *Ainsliaea* have basal tails and long apical appendages. The tails can be smooth to slightly pilose (Fig. 1R; *Ainsliaea cordifolia*, *A. macrocephala*) or more commonly short-pilose (Fig. 1S; *A. apiculata*, *A. fragrans*, *A. reflexa*, *A.*

←
caesia, *A. crassifolia*, *A. dissecta*, *A. fulvipes*, *A. foliosa*, *A. henryi*, *A. hypoleuca*, *A. latifolia*, *A. macroclinidioides*, *A. macrocephala*, *A. mairei*, *A. qianiana*, *A. reflexa*, *A. spicata*, *A. yunnanensis*. D₂. Capitula 1- to 3-fasciculate (only one capitulum shown): *A. apteroides*, *A. chapaensis*, *A. cordifolia*, *A. fragrans*, *A. gracilis*, *A. grossedentata*, *A. kawakamii*, *A. parvifolia*, *A. paucicapitata*, *A. rubrinervis*).

pertyoides); rarely they are pilose (Fig. 1T; *A. uniflora*). The feature of apiculate anther appendages that Bremer (1994) considered to be a synapomorphy for *Ainsliaea* is variable within the genus; most species have apical anther appendages rounded or truncate (Fig. 1M, N), some have apiculate appendages (Fig. 1P, Q), and a few may be emarginate (Fig. 1L; *A. walkeri*, *A. linearis*) or acute (Fig. 1O; *A. foliosa*). Furthermore, apiculate apical appendages also appear in species apparently not related from a morphological point of view (*A. uniflora*, *A. angustata*, *A. dissecta*).

Style branches. In the style of all species of *Ainsliaea*, there are two vascular bundles. This has been described previously by Carlquist (1957) in *Stiffia* J. C. Mikan, *Stenopadus* S. F. Blake, and *Stomatochaeta* (S. F. Blake) Maguire & Wurdack from Mutisieae in Guayana. The style branches in all species of *Ainsliaea* are bilobate or shortly bifid (eventually longer in cleistogamous florets), and dorsally short-pilose. The apex is commonly truncate (Fig. 1U; *A. apiculata*, *A. glabra*, *A. lancangensis*, *A. reflexa*, *A. yunnanensis*), may be merely rounded (Fig. 1V; *Ainsliaea aptera*, *A. hypoleuca*, *A. linearis*), or, more rarely, obtuse to acute (Fig. 1W; *A. cordifolia*).

Pappus. The pappus in *Ainsliaea* consists of pilose and rigid bristles of all the same length and width, with bristle margins scabrid to plumose (Fig. 1X). The pappus is uniseriate in most species, with usually 30 to 40 bristles, and only *A. uniflora* exhibits a biseriate pappus, with 65 to 70 bristles. In *A. macrocephala*, with ca. 55 bristles, an intermediate condition occurs. The pappus of cleistogamous florets exceeds the corolla in length, whereas the pappus of chasmogamous florets is shorter than their associated corollas.

Achenes. In the achenes of *Ainsliaea* usually 10 (rarely nine or 11) vascular bundles are present. In all these achenes, these bundles fuse into a single vascular strand at the achene base. The presence of 10 (or nine) bundles in achenes of Mutisieae has been described previously by Carlquist from Guayana Mutisieae (1957), in *Wunderlichia* Riedel ex Benth. & Hook. f., and *Hesperomannia* A. Gray (Carlquist, 1976).

Pollen. Pollen morphology in *Ainsliaea* has been studied for 13 species (Marticorena & Parra, 1975; Tellería & Katinas, 2005). The pollen of *Ainsliaea* is

commonly tricolpate, occasionally tricolporate, and microechinate, with ectosexina and endosexina poorly differentiated and compact. According to Tellería and Katinas (2005), this compact structure with poorly differentiated sublayers represents a unique exine type within the Mutisieae s.l.

Chromosome number. Arano (1965) suggested that *Ainsliaea* and *Pertya* may be considered phylogenetically closely related from the karyological perspective. This author pointed out that the basic number $n = 13$ in *Ainsliaea* (*A. acerifolia*, *A. apiculata*, *A. dissecta*, *A. fragrans*, *A. uniflora*, Arano 1963; *A. fauriana* $\times$ *apiculata* [= *A. \times hybrida*], *A. linearis*, Watanabe et al., 1992) seems to have been derived from $n = 14$ in *Pertya* by aneuploid reduction. In this sense, the haploid number $n = 12$, more recently reported for two species in *Ainsliaea*, *A. aptera* (Mehra et al., 1965; Gupta et al., 1989) and *A. latifolia* (Malla et al., 1977; Peng & Hsu, 1977, 1978), also appears to be aneuploid derived from $n = 13$.

Conversely, the more symmetrical karyotype of *Ainsliaea*, with respect to that of *Pertya*, is considered by Arano (1965) to be a relictual character in *Ainsliaea*.

DISTRIBUTION AND ECOLOGY

Ainsliaea is an Asiatic genus occurring from Afghanistan to Japan (Figs. 3–7). *Pertya*, with ca. 20 species and putatively ancestral to *Ainsliaea*, *Myriphnois*, and *Macroclinidium*, shows a similar distribution pattern from Afghanistan, China, Thailand, and Japan. *Myriphnois* is endemic to China (Beijing), and ca. six species of *Macroclinidium* are found in Japan.

Although five species of *Ainsliaea* are known only from their type locality (*A. caesia*, *A. chapaensis*, *A. nana*, *A. parvifolia* Merr., *A. paucicapitata*), China evidently represents the center of species distribution. There are 37 species in China, 26 of which are endemic to that country, especially well represented in Yunnan (20 species), Sichuan (18), and Guangdong (14). Two of these 36 (*A. fragrans* and *A. oblonga* Koidz.) extend their ranges to Japan (Figs. 4, 6), three (*A. elegans*, *A. hypoleuca*, and *A. reflexa*) extend to Southeast Asia and Indonesia (Figs. 4, 5, 7), and two (*A. latifolia* and *A. spicata*) extend here, and west to the Himalayas (Figs. 5, 7). Two species, *A. aptera* and *A. glumacea*, are restricted to the Himalayas (Figs. 3, 5). Four species (*A. brandisiana*, *A. chapaensis*, *A. pentaflora* S. E. Freire, *A. spanocephala*) occur only in Southeast Asia (Fig. 3). Four species (*A. cordifolia*, *A. dissecta*, *A. linearis*, *A. uniflora*) are endemic to Japan (Figs. 4, 5, 7). Two species, *A. acerifolia* and *A.*

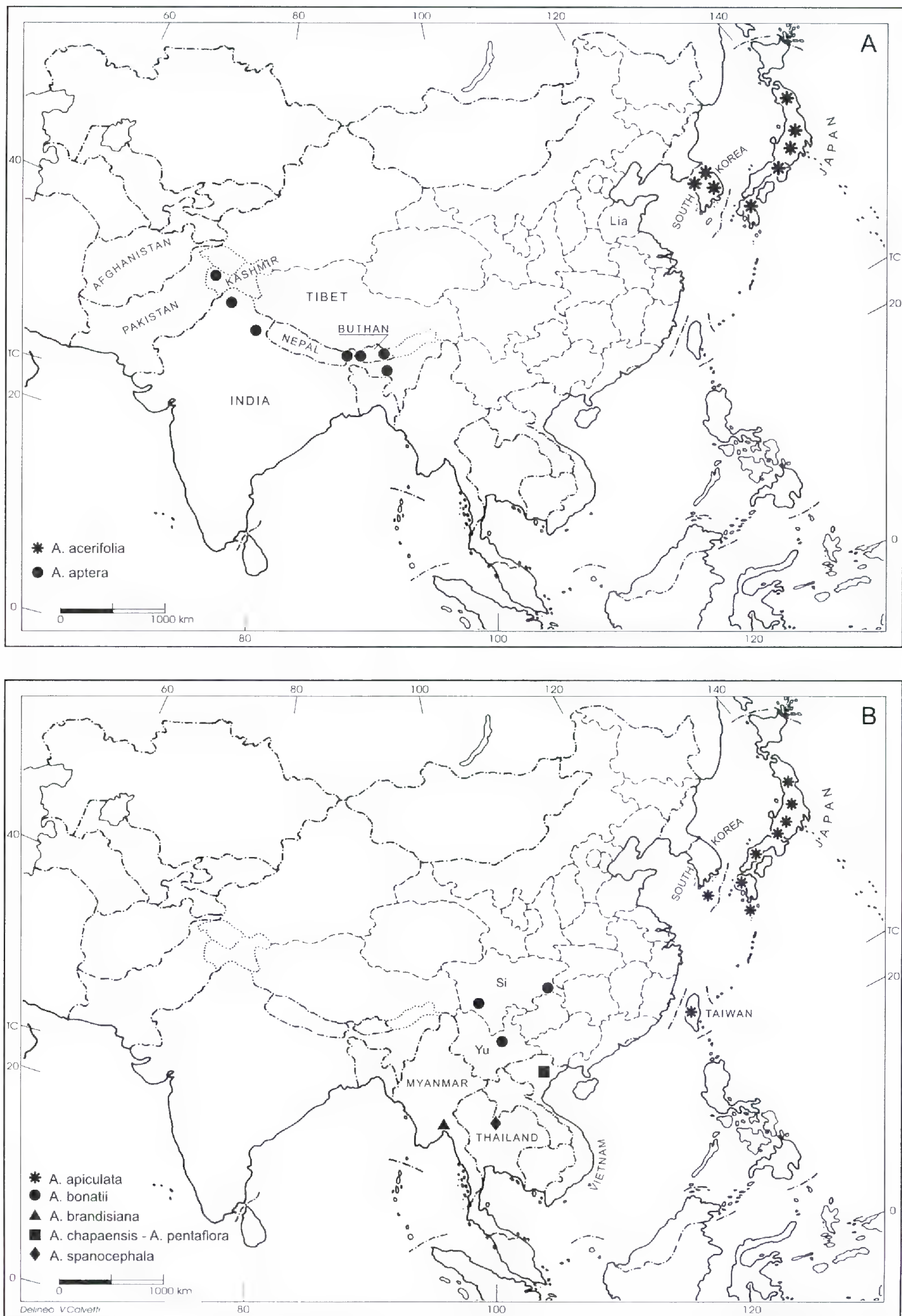


Figure 3. A. Distributions of *Ainsliaea acerifolia* (locality within Liaoning (China) unknown) and *A. aptera* (localities within Afghanistan, Nepal, Pakistan, and Tibet unknown). —B. Distributions of *Ainsliaea apiculata*, *A. bonatii*, *A. brandisiana*, *A. chapaensis*, *A. pentaflora*, and *A. spanocephala*. Lia = Liaoning; Si = Sichuan; Yu = Yunnan.

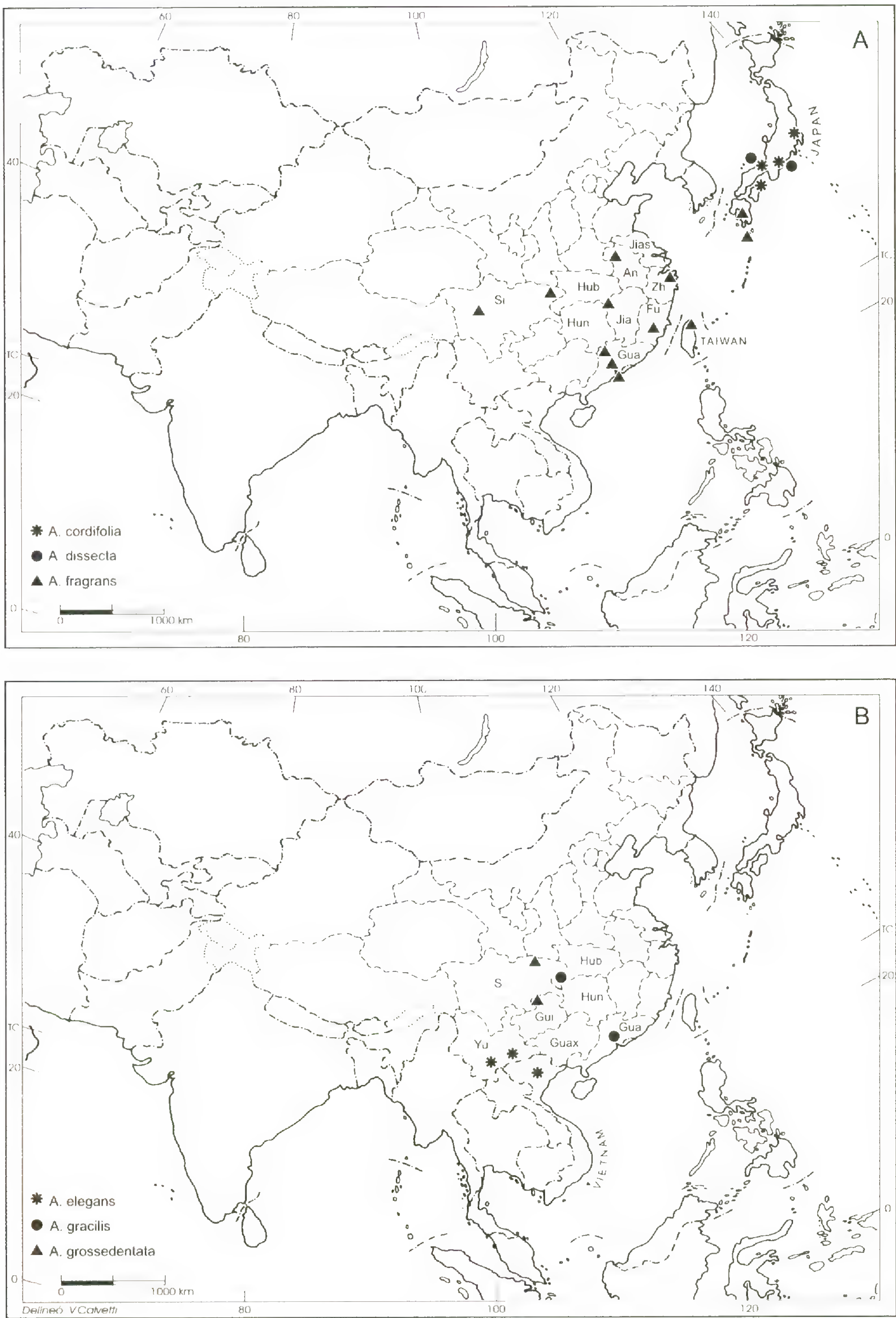


Figure 4. —A. Distributions of *Ainsliaea cordifolia*, *A. dissecta*, and *A. fragrans* (localities within Hubei, Hunan, and Jiangsu unknown). —B. Distributions of *Ainsliaea elegans* (locality within Guizhou unknown), *A. gracilis* (localities within Guangxi and Hunan unknown), and *A. grossedentata* (locality within Hubei unknown). An = Anhui; Fu = Fujian; Gui = Guizhou; Gua = Guangdong; Guax = Guangxi; Hub = Hubei; Hun = Hunan; Jias = Jiangsu; Jia = Jiangxi; Si = Sichuan; Yu = Yunnan; Zh = Zhejiang.

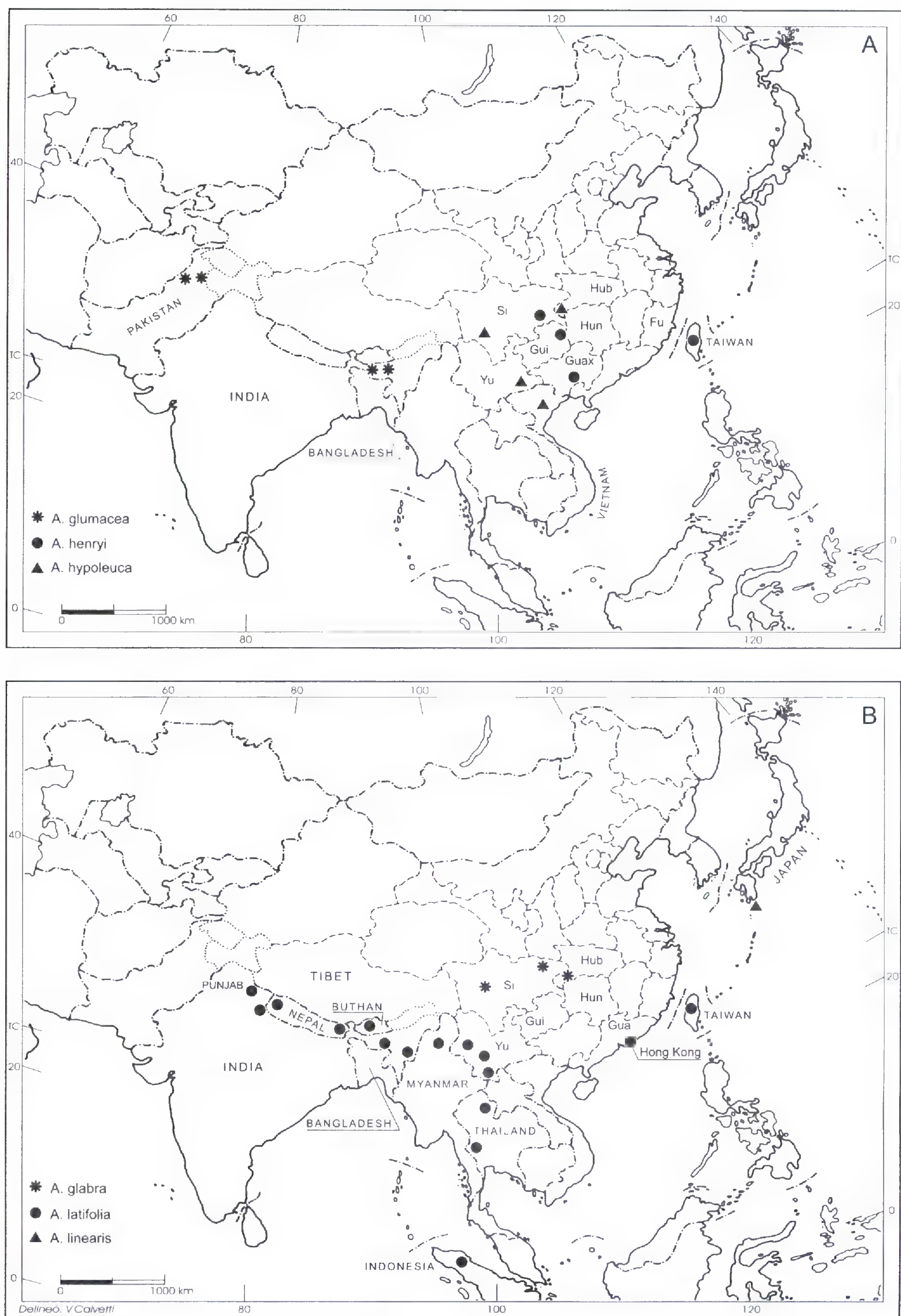


Figure 5. A. Distributions of *Ainsliaea glumacea*, *A. henryi* (localities within Fujian, Hubei, Hunan, and Yunnan unknown), and *A. hypoleuca*. —B. Distributions of *Ainsliaea glabra* (localities within Guizhou, Hunan, Tibet, and Yunnan unknown), *A. latifolia*, and *A. linearis*. Fu = Fujian; Gui = Guizhou; Gua = Guangdong; Guax = Guangxi; Hub = Hubei; Hun = Hunan; Si = Sichuan; Yu = Yunnan.

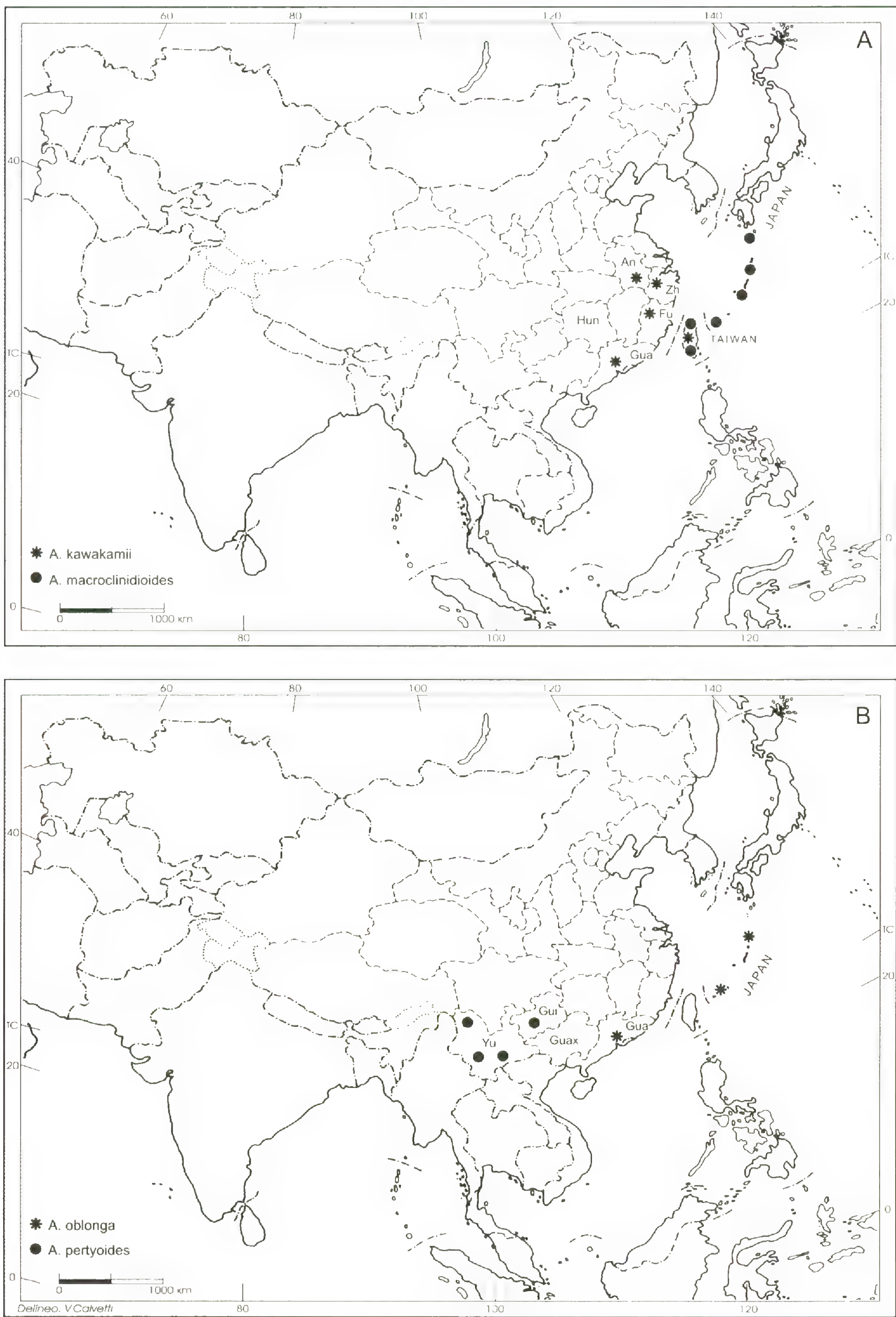


Figure 6. A. Distributions of *Ainsliaea kawakamii* (locality within Hunan unknown) and *A. macroclinidioides*. B. Distribution of *Ainsliaea oblonga* (locality within Jiangxi unknown) and *A. pertyoides*. An = Anhui; Fu = Fujian; Gui = Guizhou; Gua = Guangdong; Guax = Guangxi; Hun = Hunan; Yu = Yunnan; Zh = Zhejiang.

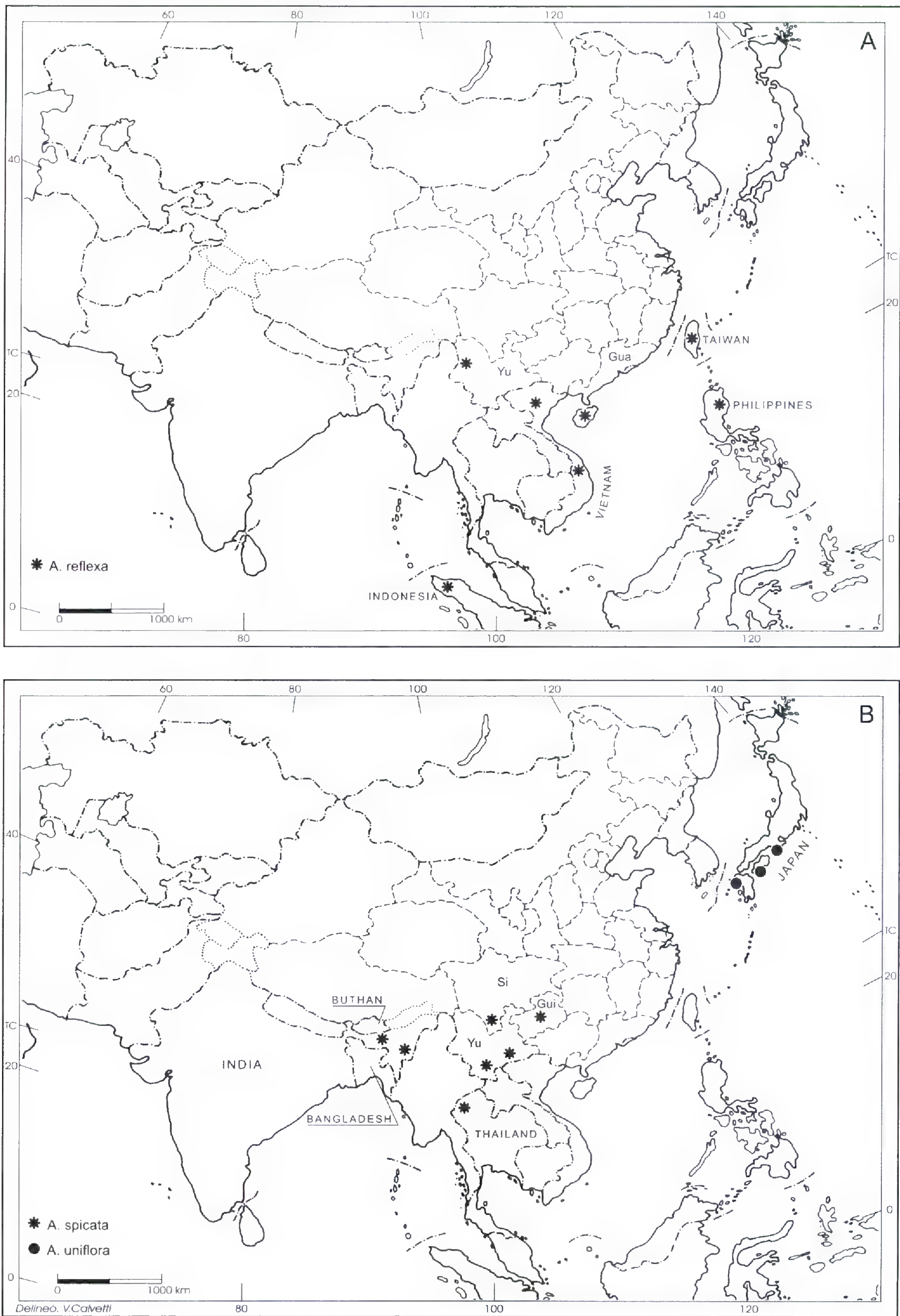


Figure 7. A. Distribution of *Ainsliaea reflexa*. —B. Distributions of *Ainsliaea spicata* (localities within Bangladesh and Bhutan unknown) and *A. uniflora*. Gui = Guizhou; Gua = Guangdong; Si = Sichuan; Yu = Yunnan.

apiculata, are found in both Japan and Korea (Fig. 3), and *A. acerifolia* reaches China (Liaoning).

There are several species, i.e., *Ainsliaea henryi*, *A. kawakamii* Hayata, *A. latifolia*, *A. reflexa*, that indicate a floristic relationship between Taiwan and China (Figs. 5–7). Others, such as *A. apiculata* and *A. macroclinidioides*, associate Taiwan with Japan (Figs. 3, 6). *Ainsliaea fragrans* is present in all three: China, Taiwan, and Japan (Fig. 4).

Hu (1958) mentioned that many taxa in China showed an S-shaped distribution along the upper and middle Yangtze River, from Yunnan, Sichuan, and Hubei. Certain species of *Ainsliaea* are found in these provinces, e.g., *A. bonatii* (Fig. 3), *A. hypoleuca* (whose range extends to Vietnam, Fig. 5), *A. elegans*, *A. gracilis*, *A. grossedentata* (Fig. 4), *A. glabra* (ranging into Xizang on the west and Guizhou and Hunan in the east, Fig. 5), *A. henryi* (whose range extends to Fujian and Taiwan, Fig. 5), *A. pertyoides* (Fig. 6), and *A. spicata* (found from India and Bhutan and east to Thailand, Fig. 7).

According to the floristic regions of the world of Takhtajan (1986), *Ainsliaea* is present in three regions: most species occur in the Eastern Asiatic Region (corresponding to the Eastern Asiatic Kingdom of Wu & Wu, 1996), a few reach the Indochine Region (*A. brandisiana*, *A. chapaensis*, *A. elegans*, *A. hypoleuca*, *A. latifolia*, *A. pentaflora*, *A. reflexa*, *A. spanocephala*, *A. spicata*), and only two extend into the Malasian Region (*A. latifolia* and *A. reflexa*). The closer association between the Eastern Asiatic Region (principally southern Yunnan), Indochine Region (Vietnam, Thailand, and Hainan Island), and Malasian Region (Indonesia, Philippines) was previously pointed out by Zhu et al. (2003).

The distribution of the species of section *Ainsliaea* and section *Aggregatae* agrees in general with the two subkingdoms proposed by Wu and Wu (1996) within the Malasian Region, i.e., Sino-Himalayan Forest subkingdom and Sino-Japanese Forest subkingdom, respectively.

Species of *Ainsliaea* are found in warm temperate climates, growing in evergreen or mixed forests. A large majority seem to prefer the wettest conditions, often growing along shaded stream banks and in swampy thickets (*A. apiculata*, *A. glumacea*, *A. spanocephala*, *A. uniflora*, *A. walkeri*). Other taxa (*A. hypoleuca*, *A. latifolia*, *A. macrocephala*, *A. parvifolia*, *A. spicata*), however, prefer drier conditions, being found in full sun, openings in the forest, forest margins, and on grassy slopes. Arano (1965) suggested that the high endemism in China is the result of the deterioration of climatic conditions, which affected the distribution of *Ainsliaea* species because they become relictual in warmer climates.

PHYLOGENETIC ANALYSIS

The phylogenetic analysis resulted in three most parsimonious trees (MPTs), each with 210 steps, and a fit = 142.6 (fit rescaled 29%), with the strict consensus cladogram shown in Figure 8.

These MPTs differ in one respect only. The *Ainsliaea chapaensis*–*A. glabra*–*A. yunnanensis* clade in one tree is sister to the *A. fulvipes* Jeffrey & W. W. Sm.–*A. elegans*–*A. fragrans*–*A. cavaleriei*–*A. spanocephala*–*A. angustata*–*A. pingbianensis* clade, whereas in the other trees the *A. chapaensis*–*A. glabra*–*A. yunnanensis* clade falls within a polytomy. In one of two trees, the polytomy contains the *A. fulvipes*–*A. elegans*–*A. fragrans*–*A. cavaleriei*–*A. spanocephala*–*A. angustata*–*A. pingbianensis* clade, and in the third tree, which is identical to the strict consensus cladogram, the polytomy also contains the *A. latifolia*–*A. bonatii*–*A. foliosa*–*A. hypoleuca*–*A. reflexa*–*A. macrocephala*–*A. qianiana* S. E. Freire clade.

There was extensive homoplasy that, combined with the low number of characters, resulted in a lack of support for most branches. A high jackknife value was found for the sister genera *Macroclinidium* and *Ainsliaea* (84), and *Ainsliaea* also had a relatively high jackknife value (61). Four clades (Fig. 8) were supported: (1) all species of *Ainsliaea* (except *A. uniflora*) clade (52); (2) *A. linearis*–*A. oblonga*–*A. macroclinidioides*–*A. gracilis*–*A. parvifolia*–*A. apteroides*–*A. apiculata*–*A. acerifolia*–*A. grossedentata*–*A. cordifolia*–*A. dissecta* (53); (3) *A. grossedentata*–*A. cordifolia*–*A. dissecta* (55); and (4) *A. cordifolia*–*A. dissecta* (60).

Synapomorphies (cf. Table 1) are mapped onto the phylogeny in Figure 9.

The strict consensus cladogram (Fig. 8) shows that *Ainsliaea uniflora* is the first taxon to split off, followed by *A. lancangensis*. Next appear two clades, the clade *A. kawakami*–*A. trinervis* Y. C. Tseng–*A. linearis*–*A. oblonga*–*A. macroclinidioides*–*A. gracilis*–*A. parvifolia*–*A. apteroides*–*A. apiculata*–*A. acerifolia*–*A. grossedentata*–*A. cordifolia*–*A. dissecta* and the clade leading to the remaining species in *Ainsliaea*. Jackknife values were not high (the majority of branches are not supported), but this may be expected for cladistic analyses based solely on morphological characters. However, good support was found for *Ainsliaea* as a whole, and therefore, *Ainsliaea* is well defined as a monophyletic group, with three synapomorphies supporting its distinction from *Macroclinidium*. These synapomorphies include few florets (Table 1, char. 22 [2, 3]) and plumose pappus bristles all the same length and width (Table 1, char. 26 [1], char. 28 [1]). Of these, character 22 reverses in *A. pentaflora* and *A. spanocephala* (Table 1, char. 22 [0]).

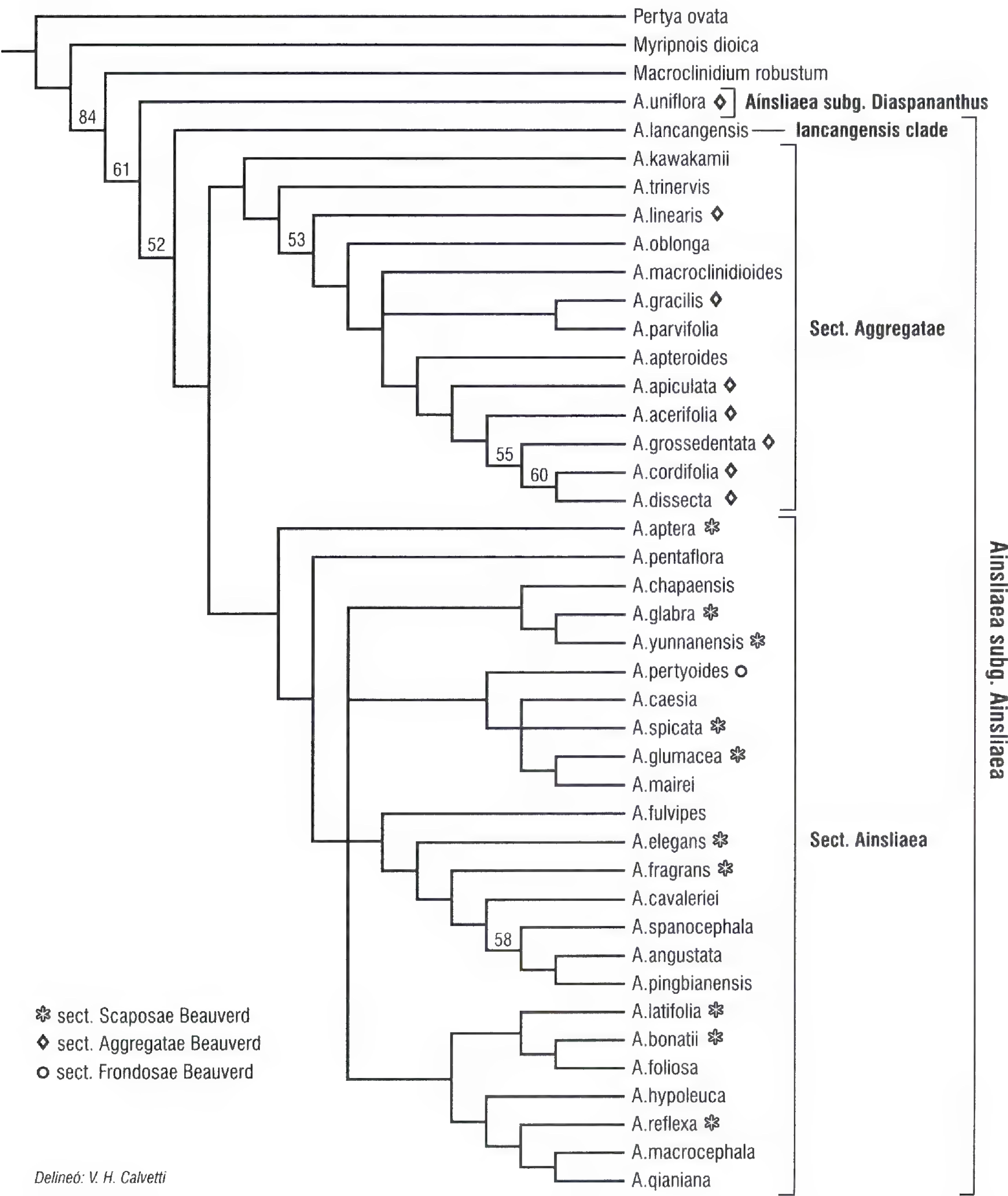


Figure 8. Strict consensus cladogram from three most parsimonious cladograms. Numbers above branches denote jackknife frequencies; only significance values (above 50) appear. Vertical bars delimit *Ainsliaea* subgenera and sections followed in the present study.

Important relationships within *Ainsliaea*, confirmed by the results of the phylogenetic analysis, have been recognized in previous taxonomic studies. The close relationship of *A. uniflora* (sometimes placed in the monotypic genus *Diaspananthus* Miq.) and the remaining species of *Ainsliaea* is in agreement with Kitamura (1938), who considered that *A. uniflora* belonged to the genus based on the plumose pappus,

but as an isolated subgenus within *Ainsliaea*. This relationship is also supported by the analysis presented here. Beauverd (1909) presented a taxonomic arrangement of *Ainsliaea* based on plant habit in which the species were arranged in three sections: section *Scaposae*, section *Aggregatae*, and section *Frondosae* (see Taxonomic History). The most striking difference between the cladogram found in the present

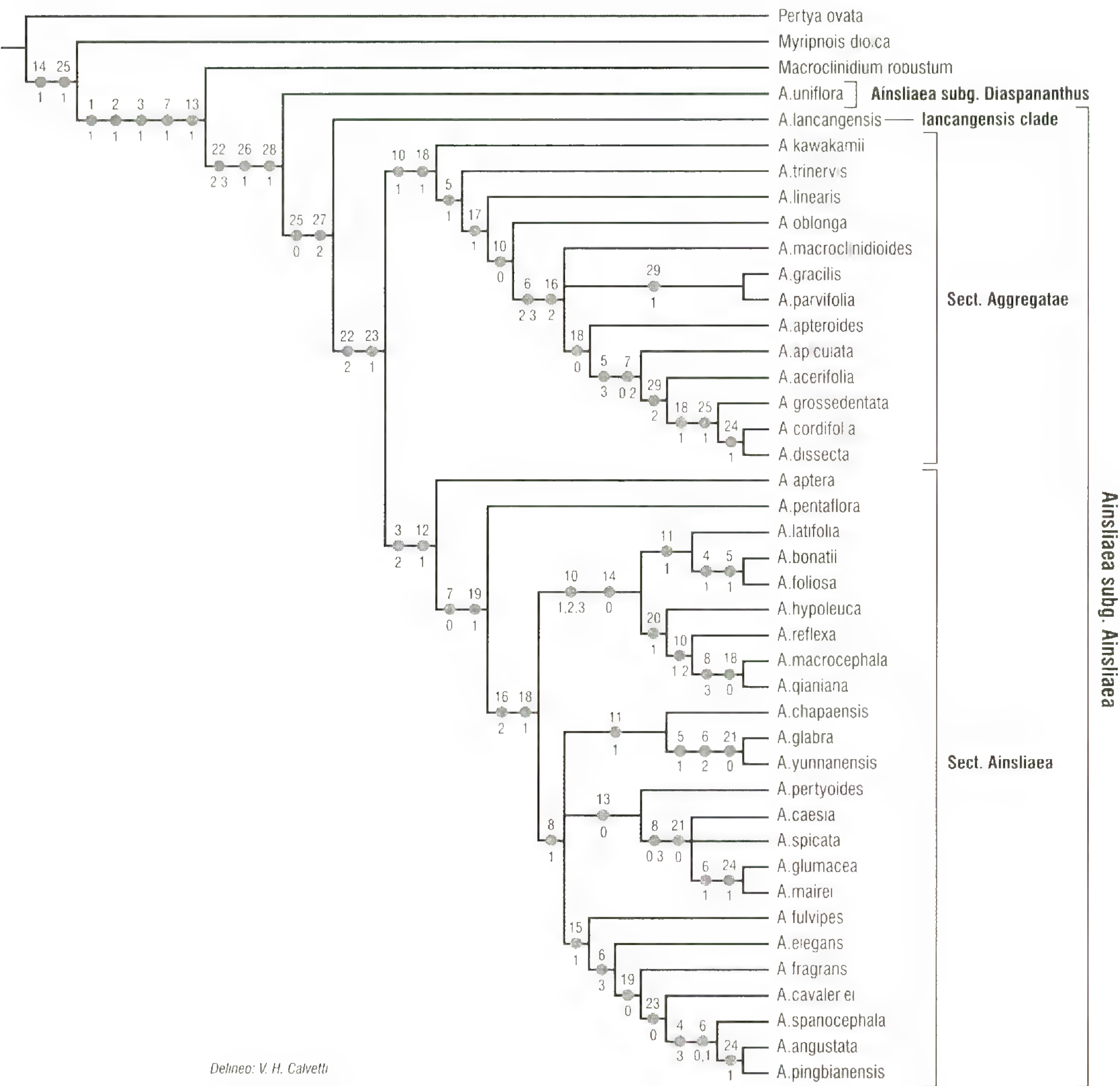


Figure 9. One of the most parsimonious cladograms found by Peewee (210 steps length, fit = 146.2, fit rescaled = 29%), showing all characters (numbers above gray dots; see Table 1) and states (numbers below gray dots; see Table 1) for clades.

analysis (Fig. 8) and Beauverd's sections is the position of *A. pertyoides*. This species is strikingly different from all other species in *Ainsliaea* (it has the greatest number, six, of apomorphies of the species, i.e., char. 1, state 0: shrub; char. 2, state 0: stem branched; char. 3, state 0: leaf alternate; char. 7, state 1: leaf acuminate; char. 16, state 0: capitula few on terminal leaf branchlets; char. 18, state 0: involucre 12–15 mm high). These features led Beauverd to place this species in a separate section (section *Frondosae*). However, Figure 8 shows that *A. pertyoides* is firmly positioned in the cladogram grouping with *A. caesia*–*A. spicata*–*A. glumacea*–*A. mairei*, within section *Ainsliaea*.

Based on the present analysis, a modified infra-generic classification for *Ainsliaea* is presented here

and is indicated on the cladogram (Fig. 8): subgenus *Diaspananthus* (*A. uniflora*) and subgenus *Ainsliaea* with two sections, section *Ainsliaea* and section *Aggregatae*. Although they do not have strong support, these four subgeneric taxa are in accord with the remaining criteria outlined by Backlund and Bremer (1998) for general principles of classification, i.e., they are monophyletic and are recognizable based on morphological characters. Furthermore, these infra-generic clades, established as subgenera and sections by traditional systematists, have additional support from a historical perspective.

The isolated clade with *Ainsliaea lancangensis* is formally assigned to subgenus *Ainsliaea*, but it is difficult to assign it to any section based on morphological data, and it needs further investigation.

TAXONOMIC TREATMENT

Ainsliaea DC., Prodr. 7: 13. 1838. *Ainsliaea* subg. *Eu-Ainsliaea* Kitam., J. Jap. Bot. 14: 299. 1938. TYPE: *Ainsliaea pteropoda* DC. (= *Ainsliaea latifolia* (D. Don) Sch. Bip.), lectotype, designated here.

Perennial herbs, more rarely small shrubs, scapose, producing subterranean rhizomes, glabrous or densely pubescent with long crisped, straight, or T-shaped trichomes; stems erect, slender, terete, simple (occasionally branched and leafy above). Leaves simple, alternate, or, more commonly, in basal rosettes or clustered at the median part of the stem; sessile or distinctly petiolate with petioles alate or wingless; leaf blades mostly simple, entire or lobed; linear, ovate, elliptic, obovate, deltoid, or subrounded; chartaceous, subcoriaceous, or somewhat fleshy and subcarnose; base attenuate, cuneate, rounded to truncate, or subcordate to conspicuously cordate; margins denticulate-mucronate to dentate-mucronate; palmate-pinnate, 3- to 5-nerved or palmateveined, 7- to 9-nerved. Capitula homogamous, arranged in thyrsoid or stachyoid inflorescences, commonly nodding in anthesis; involucre often pluriserial, cylindrical to narrowly obdeltate; peduncles commonly bracteolate, with upper bracts transitioning to involucre; phyllaries papyraceous or coriaceous, glabrous or pilose, usually ovate to ovate-lanceolate, acute or acuminate at the apex. Florets 1 to 5, hermaphrodite, chasmogamous or cleistogamous; corollas ligulate, larger than pappus bristles; lip irregularly deeply lobed, with lobes linear-oblong, reflexed and usually coiled; tube usually as long as the lip or slightly shorter (in chasmogamous florets) or pseudoligulate, tubular, shorter than pappus bristles, 4- or 5-lobed, with one deeper slit but without an expanded lip (in cleistogamous florets); glabrous, apically papillose; 5-nerved (marginal veins fused), without central veins; anthers 5, with apical appendages rounded to truncate or apiculate (more rarely emarginate); sagittate, with long tails smooth to slightly pilose or pilose; style branches bilobate to shortly branched, obtuse or rounded to truncate, dorsally shortly papillose. Achenes oblong to oblong-elliptic or oblong-obovate, usually those of cleistogamous florets larger than the chasmogamous florets; glabrous or pilose; (9)10-nerved, costate more prominent in glabrous or sparsely pilose achenes; pappus bristles usually uniseriate, more rarely biseriate; margins plumose.

Ainsliaea was circumscribed by A. P. de Candolle (Prodr. 7: 13. 1838) as containing two species (*A. pteropoda* and *A. aptera*), no species name being designated by de Candolle as the type. Conversely, no type species was mentioned by Kitamura (1938) for his subgenus *Eu-Ainsliaea*. According to the proto-

logue, de Candolle's purpose was to transfer the species of D. Don (*Liatris latifolia*) to a new genus. Therefore, even if both species are in accordance with the protologue, *Ainsliaea pteropoda* DC. (= *Ainsliaea latifolia* (D. Don) Sch. Bip.) is here designated as lectotype of *Ainsliaea* DC.

KEY TO THE SUBGENERA, SECTIONS, AND "LANCANGENSIS CLADE" OF
AINSLIAEA IN ASIA

- 1a. Pappus biseriate I. subg. *Diaspananthus*
- 1b. Pappus uniseriate II. subg. *Ainsliaea*
 - 2a. Capitula 1-flowered A. "Lancangensis clade"
 - 2b. Capitula 2- to 5-flowered.
 - 3a. Leaves in basal rosette (rarely alternate); capitula with peduncles, when present, ebracteate B. sect. *Ainsliaea*
 - 3b. Leaves usually clustered at the median part of the stem; capitula with peduncles, when present, usually bracteate C. sect. *Aggregatae*

I. *Ainsliaea* subg. *Diaspananthus* (Miq.) Kitam., J. Jap. Bot. 14(5): 298. 1938. *Diaspananthus* Miq., Ann. Mus. Bot. Lugd. Bat. 2: 186. 1866, as "*Diaspanthus*." TYPE: *Diaspananthus uniflorus* (Miq.) Kitam. (= *Ainsliaea uniflora* Sch. Bip.).

Perennial herbs; stems erect, unbranched. Leaves in basal rosette. Capitula shortly pedunculate, arranged in thyrsoid inflorescences, nodding in anthesis; involucre cylindrical. Florets 1, hermaphrodite, chasmogamous; anthers with apical appendages apiculate and tails pilose; pappus bristles biseriate.

One species from Japan.

Discussion. Miquel (1866: 186) cited under his genus *Diaspananthus* one species name only, *D. palmatus* Miq., with *Ainsliaea uniflora* Sch. Bip. mentioned in parentheses immediately after the name, i.e., "*Diaspananthus palmatus* (*Ainsliaea uniflora* Sch. Bip., Pollichia 18: 187)." *Diaspananthus palmatus* is illegitimate, because it was a superfluous name that, when published, included the type *A. uniflora*, whose epithet ought to have been adopted.

Because *Diaspananthus* has corollas ligulate and plumose pappus, it is placed here as a subgenus within *Ainsliaea* as was proposed by Kitamura (1938: 298).

I. *Ainsliaea uniflora* Sch. Bip., in Jahresber. Pollichia 18: 187. 1861. *Diaspananthus uniflorus* (Sch. Bip.) Kitam., Mem. Coll. Sci., Kyoto Imp. Univ., ser. B, XV no. 3 (Comp. Jap. II) 305. 1940. TYPE: Japan. s.d., *H. Burger* & *H. Zollinger* 283 (type, K!). Figure 10.

Plants perennial, herbaceous, 0.50–0.70 m tall; stems erect, unbranched below the inflorescence, naked, and sparsely strigose. Leaves basally clus-

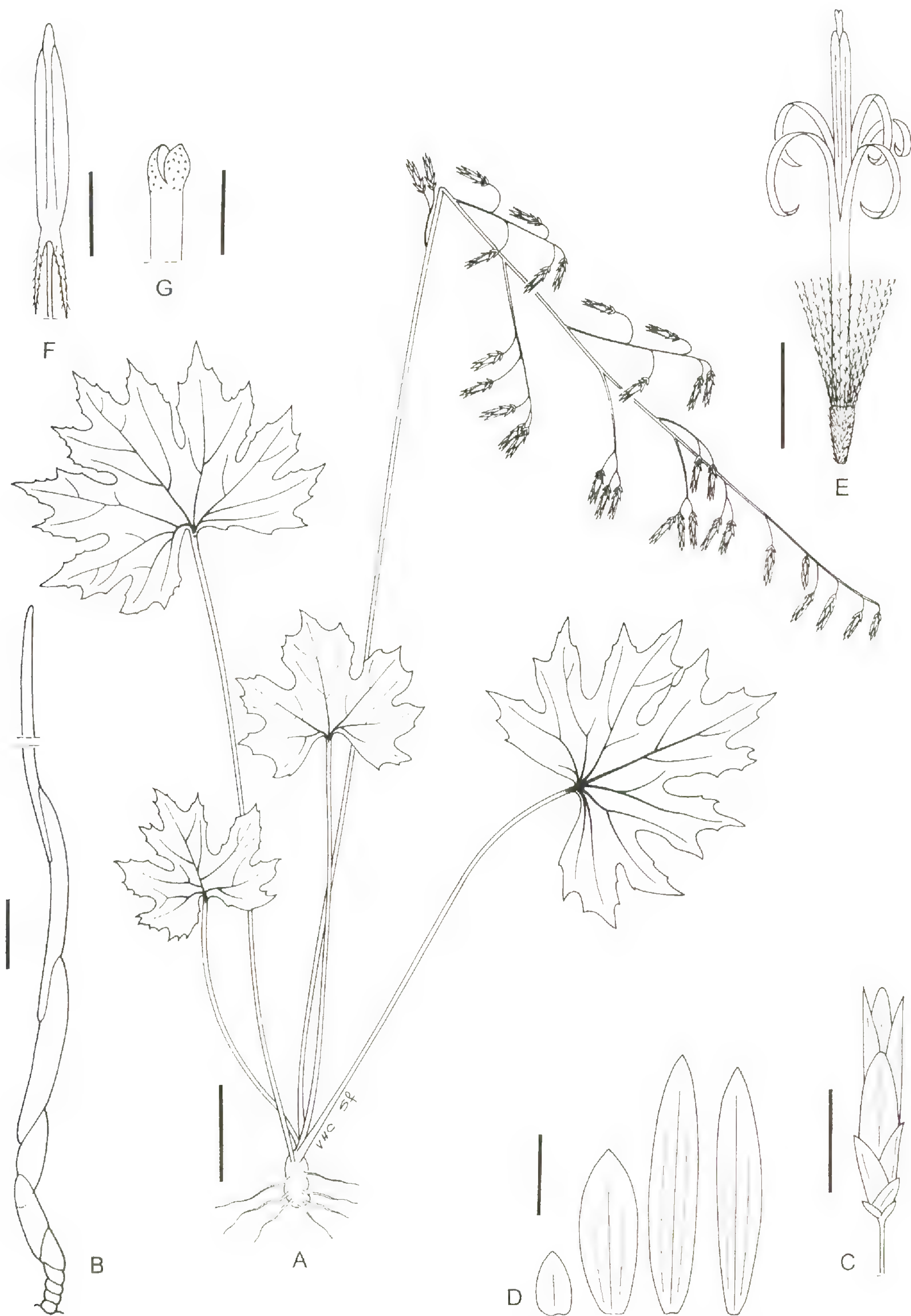


Figure 10. *Ainsliaea uniflora* Sch. Bip. —A. Habit. —B. Foliar trichome. —C. Capitulum. —D. Phyllaries. —E. Chasmogamous floret. —F. Stamen. —G. Style branches. Scale bars: A = 3 cm; B = 0.1 mm; C, E = 5 mm; D = 3 mm; F = 2 mm; G = 1 mm. Drawn from A, C–G, *Mimoro et al.* 4197 (MO); B, (US 1132181).

tered, rosulate, long-petiolate; petioles wingless, flat, longer than the blades, 14–24 cm; leaf blades chartaceous, deeply 5- to 7-lobed, 8–12 × 9–13 cm, deeply cordate at the base, lobes irregularly sinuate-dentate and mucronate-toothed (apical lobe widest); green and subglabrous above, paler below and scarsely strigose with long straight trichomes; 5- to 7-palmativeined. Capitula pedunculate, arranged in thyrsoïd inflorescence; peduncles 2–9 mm; involucre 5-seriate, cylindrical, ca. 11 × 2 mm; phyllaries papyraceous, purplish, glabrous; outer phyllaries ovate, subobtuse, 1–2 × 0.5–1 mm; inner phyllaries oblong-elliptic, subobtuse, 3-nerved, 9–10 × 1.5 mm. Florets 1, hermaphrodite, chasmogamous; corolla ligulate, ca. 20 mm, lobes ca. 7.5 mm (deeper slit ca. 10 mm), tube ca. 10 mm; anthers ca. 7 mm, apical appendages apiculate, ca. 0.7 mm, sagittate; tails ca. 2 mm, pilose; style branches short, obtuse to acute, ca. 0.5 mm. Achenes obovate, ca. 3 mm, 10-nerved, densely pilose; pappus bristles 65 to 70, ca. 6 mm.

Distribution and phenology. Japan (Honshu, Kyushu, Shikoku), collected in bodies of water, at elevations between 50 and 750 m (Fig. 7B); flowering in October.

Relationships. *Ainsliaea uniflora* may be distinguished from all other *Ainsliaea* species by its basal rosette of leaves that are deeply lobed, its capitulum of one floret, a biseriate pappus, and pilose anther tails.

Vernacular name. Kusa-yatsude (Iinuma, 1862).

Representative specimens examined. JAPAN. Honshu. **Mie:** Ikegawa, Arima-chô, Kumano-shi, K. Seto 30054 (CM); Ise, Yamada, 10 Oct. 1911, s. coll. (US 1132181); Kii, Iwotobi, Owase-machi, Kita-muro-gun, M. Furuse in 1956 (S, UC); Kii, Kitayama—river, Ooidani, Isato-machi, Kumano-shi, M. Furuse in 1961 (S). **Nara:** Nojiri, Totsukawa-mura, Yoshino-gun, side of the R. 168, K. Mimoro et al. 4197 (MO). **Wakayama:** Kobi-ro-tôge, Kogomori, Hongu-cho, Higashimuro-gun, along the R. 311, K. Mimoro et al. 4117 (MO, NY). Kyushu. **Nagasaki:** Nagasaki, Naga-yama, C. Maximowicz in 1863 (M, S, W). **Unknown:** Bungo, Sobosan, T. Yamazaki 3103 (S). Shikoku. **Kochi:** Mt. Yokokura, Ochi-cho, Takaokagun, K. Mimoro et al. 5151 (CM); Takaoka-gun, Ochi-machi, Yakokura-yama, K. Shoma et al. in 1970 (MO). **Unknown:** Nanokawa, Tosa, 27 Sep. 1894, s. coll. (US 248115). **Unknown:** Japonia, H. Burger s.n. (S, W); Montagnes Syo?, U. Faurie 11746 (MO).

II. *Ainsliaea* subg. *Ainsliaea* DC. *Ainsliaea* sect. *Scaposae* Beauverd, Bull. Soc. Bot. Genève, Sér. 2, 1: 376. 1909. TYPE: *Ainsliaea latifolia* (D. Don) Sch. Bip.

Ainsliaea sect. *Fondosae* Beauverd, Bull. Soc. Bot. Genève, Sér. 2, 1: 376. 1909. TYPE: *Ainsliaea pertyoides* Franch.

Perennial herbs (rarely small shrubs); stems erect, unbranched (rarely much branched and leafy above).

Leaves in basal rosette or clustered near the median part of the stem (rarely alternate, loosely arranged). Capitula sessile or pedunculate, arranged in thyrsoïd or stachyoid inflorescences, nodding in anthesis; involucre cylindrical to narrowly obdeltate. Florets 1 to 5, hermaphrodite, chasmogamous or cleistogamous; anthers with apical appendages rounded to truncate or apiculate (rarely emarginate) and tails smooth to slightly pilose or shortly pilose; pappus bristles uniseriate.

Forty-eight species from Afghanistan to Japan.

A. AINSLIAEA "LANCANGENSIS CLADE"

1. *Ainsliaea lancangensis* Y. Y. Qian, J. Trop. Subtrop. Bot. 8(2): 161. 2000. TYPE: China. Yunnan: Lancang, 2000 m, 26 Nov. 1993, Y. Y. Qian 3185 (holotype, HITBC not seen; isotypes, IBSC, SMAO, not seen). Figure 11.

Plants perennial, herbaceous, 0.40–0.70 m tall; stems erect, unbranched below the inflorescence, glabrous. Leaves clustered at the median part of the stem, verticillate, long-petiolate; petioles wingless, flat, glabrous, (1.5)4–9 cm; leaf blades chartaceous, subrounded, 7- to 11-palmatifid, (2)4–11 × (1.5)5–12 cm, base cordate, slightly cuneate into the petiole, lobes triangular, acute to acuminate at the apex, margins mucronate-toothed; palmately nerved; slightly concolorous, upper surface glabrous, lower surface sparsely strigose with straight trichomes, and glandular capitate trichomes; palmativeined. Capitula pedunculate, arranged in thyrsoïd inflorescence; peduncles 2–5 cm; involucre 8- or 9-seriate, cylindrical, ca. 14 × 2 mm; phyllaries papyraceous, sparsely strigose above; outer phyllaries ovate, obtuse, 1–1.3 × 0.7–0.8 mm; inner phyllaries linear-obovate, apiculate, conspicuously 3-nerved, 10–13 × 2.5–2.7 mm. Florets 1, hermaphrodite, chasmogamous; corolla ligulate, 1.3–1.7 cm, lobes ca. 9 mm (deeper slit ca. 10 mm), tube ca. 7 mm; anthers 7–7.5 mm, apical appendages apiculate, ca. 1 mm, sagittate; tails 1–1.3 mm, shortly pilose; style branches short, truncate, 0.4–0.5 mm. Achenes oblong, 6–7 mm, 10-nerved, densely pilose; pappus bristles ca. 37, 6.5–8.5 mm.

Type observation. Although neither holotype nor isotypes were available, it is a clear species from the description.

Distribution and phenology. At present, this is only known from the type collection from China (Yunnan, Lancang), from forest at 2000 m; flowering in November.

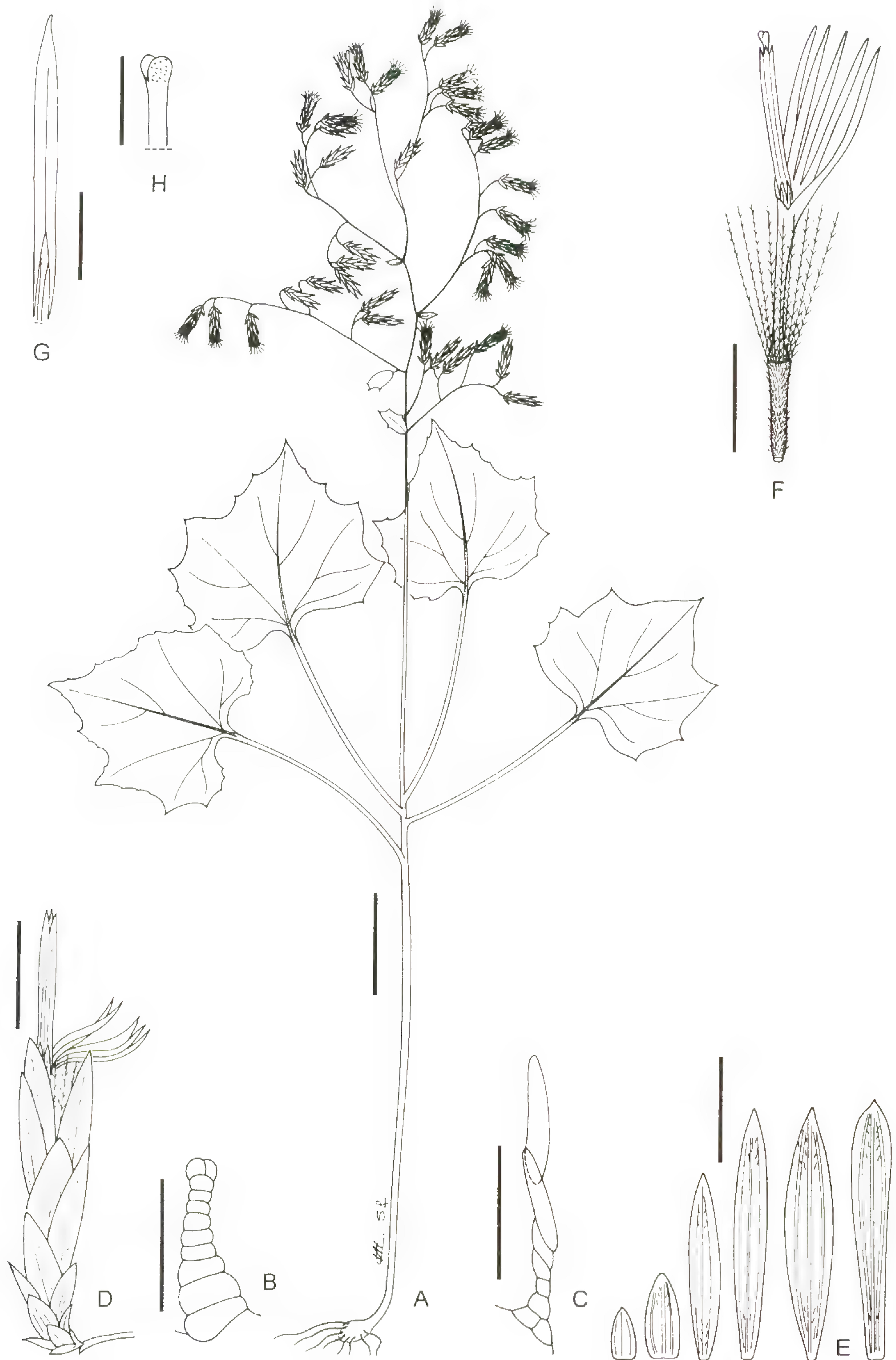


Figure 11. *Ainsliaea lancangensis* Y. Y. Qian. —A. Habit. —B, C. Foliar trichomes. —D. Capitulum. —E. Phyllaries. —F. Chasmogamous floret. —G. Stamen. —H. Style branches. Scale bars: A = 3 cm; B, C = 0.1 mm; D–F = 5 mm; G = 2 mm; H = 1 mm. Drawn from the paratype *Qian 3343* (SMAO).

Relationships. *Ainsliaea lancangensis* resembles *A. acerifolia* (principally from Japan) in its habit and leaves. Both species have leaves verticillate near the midpoint of the stem, palmately lobed leaf blades, apical anther appendages that are apiculate, and the capitula paniculate. *Ainsliaea lancangensis* is clearly distinguished by its capitula 1-flowered (vs. 3-flowered) and achenes densely pilose (vs. glabrous).

Representative specimen examined. CHINA. **Yunnan:** Lancang, Y. Y. Qian 3343 (paratype, SMAO).

B. AINSLIAEA SECT. AINSLIAEA DC.

Ainsliaea sect. **Ainsliaea** DC. TYPE: *Ainsliaea latifolia* (D. Don) Sch. Bip.

Perennial herbs (rarely small shrubs); stems erect, unbranched (rarely much branched and leafy above). Leaves basally rosulate (rarely clustered above stem base or alternate and loosely arranged). Florets usually 3, sometimes 4 or 5, rarely 2; anthers with apical appendages commonly rounded, sometimes truncate or apiculate (rarely emarginate), and tails shortly pilose or sometimes smooth to slightly pilose.

Thirty-three species from Afghanistan, Bhutan, Southeast China (Anhui, Fujian, Guangdong, Guangxi, Guizhou, Hubei, Hunan, Sichuan, Yunnan, and Xizang), India, Indonesia, Myanmar, Nepal, Pakistan, Philippines, Taiwan, Thailand, and Vietnam.

Key to the species of *Ainsliaea* section *Ainsliaea* in Asia

- 1a. Small shrubs; stems branched and sparsely leafy from the median part of the plant; floriferous branches leafy 24. *A. pertyoides*
- 1b. Perennial herbs; stems simple or branched above the inflorescence; floriferous branches naked or with few reduced leaves.
 - 2a. Leaf blades uniformly narrowed at the base.
 - 3a. Leaves sericeous on both surfaces 19. *A. mairei*
 - 3b. Leaves glabrous or sparsely strigose below 14. *A. glumacea*
 - 2b. Leaf blades abruptly narrowed into the petiole.
 - 4a. Leaves short-petiolate (petioles 4–10 mm long).
 - 5a. Leaf blades lanceolate; achenes glabrous 5. *A. caesia*
 - 5b. Leaf blades obovate or obovate to pandurate; achenes pilose 32. *A. spicata*
 - 4b. Leaves long-petiolate (petioles more than 10 mm long).
 - 6a. Petioles wholly winged (more than 1.5 mm wide at the upper point) or winged on the upper half.
 - 7a. Leaf bases cordate.
 - 8a. Phyllaries acuminate at the apex, dorsally glandular-pilose; capitula pedunculate . . . 30. *A. smithii*
 - 8b. Phyllaries acute at the apex, apically strigose; capitula sessile 3. *A. bonatii*
 - 7b. Leaf bases rounded or attenuate.
 - 9a. Involucre 12–18 mm long.
 - 10a. Anther appendages truncate; phyllaries and leaves pilose 18. *A. macrocephala*
 - 10b. Anther appendages apiculate; phyllaries and leaves glabrous 26. *A. qianiana*
 - 9b. Involucre less than 10 mm long (occasionally equal to 10 mm).
 - 11a. Leaves discolored, with upper surface deep green and lower surface white . . . 16. *A. hypoleuca*
 - 11b. Leaves concolorous or only slightly discolored.
 - 12a. Leaves approximate above the base 10. *A. foliosa*
 - 12b. Leaves rosulate.
 - 13a. Leaf margins straight; leaf bases rounded, petioles wholly winged 17. *A. latifolia*
 - 13b. Leaf margins wavy; leaf bases cuneate and commonly decurrent into the petiole (petioles winged on the upper half).
 - 14a. Achenes glabrous or apically pilose 15. *A. henryi*
 - 14b. Achenes pilose 28. *A. reflexa*
 - 6b. Petioles wingless (leaf blades cuneate but petioles not winged in *A. glabra*, *A. nervosa*, *A. pentaflora*, *A. henryi*, *A. yunnanensis*).
 - 15a. Capitula 5-flowered.
 - 16a. Leaf blades ovate, leaf bases cuneate; foliar trichomes 1-seriate 23. *A. pentaflora*
 - 16b. Leaf blades oblong-elliptic; foliar trichomes 3-seriate.
 - 17a. Leaf bases rounded 31. *A. spanocephala*
 - 17b. Leaf bases cordate 4. *A. brandisiana*
 - 15b. Capitula 2- or 3(4)-flowered.
 - 18a. Leaf margins dentate.
 - 19a. Blades acute to acuminate at the apex, slightly concolorous, sparsely strigose to subglabrous on both surfaces 2. *A. aptera*
 - 19b. Blades obtuse to rounded at the apex, discolored, with upper surface lanuginose and lower surface white-tomentose 8. *A. crassifolia*
 - 18b. Leaf margins entire to denticulate.
 - 20a. Leaf bases cordate.

- 21a. Capitula 2-flowered 9. *A. elegans*
- 21b. Capitula 3(4)-flowered.
 - 22a. Petioles densely strigose.
 - 23a. Anther appendages emarginate; achenes pilose above 11. *A. fragrans*
 - 23b. Anther appendages apiculate; achenes pilose.
 - 24a. Phyllaries apically pilose 6. *A. cavaleriei*
 - 24b. Phyllaries glabrous.
 - 25a. Blades more or less concolorous. 27. *A. ramosa*
 - 25b. Blades with lower surface whitish green, veins red 29. *A. rubrinervis*
 - 22b. Petioles lanuginose or glabrous.
 - 26a. Blades ovate, 7–16 × 5–10 mm; achenes glabrous 20. *A. nana*
 - 26b. Blades subrotundate, 10–15 × 10–15 mm; achenes pilose 22. *A. paucicapitata*
- 20b. Leaf bases rounded or cuneate.
 - 27a. Petioles densely strigose.
 - 28a. Leaf blades elliptic. 1. *A. angustata*
 - 28b. Leaf blades oblong to elliptic.
 - 29a. Blades 8–12 cm long; anther appendages apiculate 25. *A. pingbianensis*
 - 29b. Blades 3–7.5 cm long; anther appendages rounded 12. *A. fulvipes*
 - 27b. Petioles lanuginose or glabrous.
 - 30a. Blades elliptic, slightly fleshy, glabrous to subglabrous.
 - 31a. Blades broadly elliptic, 3.5–6.5 mm wide; apex acute-acuminate 13. *A. glabra*
 - 31b. Blades linear-elliptic, 2–2.5 mm wide; apex acute 21. *A. nerrosa*
 - 30b. Blades ovate.
 - 32a. Blades membranous, subglabrous.
 - 33a. Achenes glabrous or apically pilose. 15. *A. henryi*
 - 33b. Achenes pilose 28. *A. reflexa*
 - 32b. Blades coriaceous or subcoriaceous, strigose
 - 34a. Involucre 13–15 mm long, foliar trichomes T-shaped 33. *A. yunnanensis*
 - 34b. Involucre 8–10 mm long, foliar trichomes straight 7. *A. chapaensis*

1. **Ainsliaea angustata** C. C. Chang, Sinensia 5(1–2): 158. 1934. TYPE: China. Szechuan: Ma-Ping hsien, May 1930, W. P. Fang 1641 (holotype, N not seen; isotype, PE not seen; PE photo LP!). Figure 12.

Plants perennial, herbaceous, 0.25–0.50 m tall; stems erect, apically branched, with few leaves much reduced, densely strigose. Leaves basally clustered, rosulate, long-petiolate; petioles wingless, 3–9 cm, densely strigose; leaf blades subcoriaceous, linear-elliptic to narrowly lanceolate, 4.5–9 × 1–1.9 cm, apex acute to obtuse-mucronate, base attenuate into the petiole, margins entire to shallowly denticulate-mucronate and strigose; strigose on both surfaces, with long straight trichomes, 1–1.5 mm; palmati-pinnate, 3-nerved; cauline leaves short-petiolate, linear-elliptic. Capitula short-pedunculate, arranged in thyrsoid inflorescence; involucre 5- to 6-seriate, cylindrical, 8–10 × 4 mm; phyllaries papyraceous, dorsally with glandular trichomes; outer phyllaries linear-ovate, acute at the apex, ca. 2.5 × 0.8 mm; inner phyllaries linear-elliptic, acute at the apex, 3- to 5-nerved, ca. 7.5 × 1.5 mm. Florets 3, hermaphrodite, chasmogamous; corollas light pink, ligulate, ca. 9 mm, lobes ca.

4 mm (deeper slit ca. 5 mm), tube ca. 4 mm; anthers purple, ca. 4.5 mm, apical appendages acuminate, 0.4–0.5 mm, sagittate; tails smooth to slightly pilose, 0.5–0.7 mm; style branches short, truncate, ca. 0.5 mm. Achenes oblong, 1.5–4 mm, 10-nerved, densely pilose; pappus bristles ca. 25 to 30, 6–6.5 mm.

Distribution and phenology. *Ainsliaea angustata* is known only from China (Sichuan), at ca. 1300 m; collected in flower in October.

Relationships. This species is characterized by its apiculate anther appendages, rosulate leaves with long strigose petioles, and narrow leaf blades. *Ainsliaea angustata* exhibits some likeness to *A. glumacea* in its habit and achenes. However, the latter species is amply distinguished by its rounded apical anther appendages and its petioles narrowly or broadly winged, and sparsely pilose. This species also resembles *A. fulvipes*, but *A. angustata* is distinct from *A. fulvipes* by its leaf blades linear to oblong (vs. oblong to elliptic), phyllaries glabrous (vs. pilose above), and apical anther appendages acuminate (vs. rounded).

Representative specimens examined. CHINA. Sichuan: Szechuan, Tien-chuan-hsien, K. L. Chu 2273 (PE, W); Ma-



Figure 12. *Ainsliaea angustata* C. C. Chang. —A. Habit. —B. Foliar trichome. —C. Phyllaries. —D. Capitulum. —E. Chasmogamous floret. —F. Stamen. —G. Style branches. Scale bars: A = 3 cm; B = 0.2 mm; C, E = 3 mm; D = 5 mm; F, G = 1 mm. Drawn from *Chu* 2273 (PE).



Figure 13. *Ainsliaea aptera* DC. —A. Habit. —B, C. Foliar trichomes. —D. Capitulum. —E. Chasmogamous floret. —F. Style branches of chasmogamous floret. —G. Stamen of chasmogamous floret. —H. Cleistogamous floret. Scale bars: A = 3 cm; B = 0.1 mm; C = 0.2 mm; D, E = 5 mm; F, G = 2 mm; H = 5 mm. Drawn from A, *Hooker f. & Thomson s.n.* (W); B, C, *Koelz 129* (NY); D–G, *Koelz 1789* (NY); H, *Kazmi in 1965* (M).

Ping hsien, W. P. Fang 269 (paratype, N not seen); South Kansu, Pikow Mtns., F. Kingdon Ward in 1910 (paratype, CGE not seen).

2. *Ainsliaea aptera* DC., Prodr. 7: 14. 1838. TYPE: Nepal. "India orientale," Royle in 1833 (lectotype, designated here, K!). Figure 13.

Ainsliaea aptera f. *paniculata* Kuntze, Rev. Gen. Pl. 1: 304. 1891. Syn. nov. TYPE. India. Sikkim, 2400 m. Nov. 1875, Herb. O. Kuntze 6956 (type, NY!).

Plants perennial, herbaceous, 0.30–0.75 m tall; stems erect, unbranched below the inflorescence, leafy, loosely strigose. Leaves basally clustered, 5–6(9) cm above stem base, long-petiolate; petioles wingless, flat, 5–13(20) mm, strigose; leaf blades chartaceous, ovate to deltate or deltoid, 5.5–15 × 4.5–12 cm, apex acute to acuminate-mucronate, base cordate, margins dentate; upper surface subglabrous, lower surface strigose, the surface paler below, with scarce glandular biseriate trichomes and long straight trichomes, 0.7–1 mm; palmate-pinnate, 5- to 7-nerved; cauline leaves alternate, short-petiolate to sessile, ovate to ovate-lanceolate. Capitula sessile or short-pedunculate (occasionally long-pedunculate), arranged in a stachyoid inflorescence; involucre 5- or 6-seriate, cylindrical, 8–15(22) × 2–4(6) mm; phyllaries coriaceous, glabrous or dorsally with glandular trichomes; outer phyllaries ovate, acute, 1.5–2 × ca. 1 mm; inner phyllaries linear-oblong, acute, 3-nerved, 11–14 × ca. 1.2 mm. Florets 3(4), hermaphrodite, chasmogamous and cleistogamous (at different or same seasons); corollas white with lavender center; *chasmogamous* florets with corolla ligulate, 11–13 mm, lobes ca. 7 mm (deeper slit ca. 8 mm), tube 4–5 mm; anthers purple, 3–4.5 mm, apical appendages rounded, ca. 0.8 mm, sagittate; tails ca. 1.5 mm, shortly pilose; style branches short, rounded, ca. 0.4 mm. Achenes oblong, (2)3–5 mm, 10-nerved, densely pilose; pappus bristles ca. 30 to 34(43), 5–8 mm; *cleistogamous* florets with corolla tubulose to pseudoligulate, 5–6 mm, 4- or 5-lobed, lobes ca. 0.2 mm (deeper slit ca. 0.3 mm); anthers much reduced, ca. 1 mm; style branches ca. 0.4 mm. Achenes 6–9 mm; pappus bristles 10–12 mm.

Distribution and phenology. A forest plant of Afghanistan, Bhutan, China (Xizang), India, Kashmir, Nepal, and Pakistan. It was collected from the floor of fir forest on damp organic soil, between 1200 and 3400 m (Fig. 3A); flowering from April to June and in November and December, fruiting from July to October and in March.

Discussion. De Candolle (1838) mentioned two syntypes in the protologue of *Ainsliaea aptera*, "Wall-

ich ann. 1821" and "Royle anno 1833." I found these two collections kept at GH and K, respectively. I propose the material *Royle in 1833*, which presents the most complete plant, as lectotype of *A. aptera*.

Ainsliaea aptera f. *paniculata* Kuntze was described on the basis of its capitula that are long-pedunculate and arranged in panicles. However, this is a variable feature throughout the range of *A. aptera*.

Relationships. *Ainsliaea aptera* most resembles *A. crassifolia*. Both taxa have leaves ovate to orbicular, with dentate margins and cordate at the base. However, the leaves in *A. aptera* are acute to acuminate at their apex and green-villose below. In contrast, *A. crassifolia* has leaves rounded at the apex and densely white-tomentose below.

Representative specimens examined. AFGHANISTAN. Herb. Kabulense, Konar, Dewagal Darrah Tal W des Chalas, Pass zum Darrah-e Mazar, O. Anders 11129 (W). BHUTAN. Dochu La, pass betw. Thimbu & Wangdu Phodrang, B. Bartholomew 1532 (US); 26 km W of Tongsa betw. Tongsa & Pele La, B. Bartholomew & D. E. Bufford 3878 (NY). CHINA. **Xizang:** "Tibet," Hügel 1241 (W). INDIA. **Assam:** Khasia, J. D. Hooker & T. Thomson s.n. (W). **Punjab:** Punjab, "prope Phagu ultra Simla, Sobha Ram," J. R. Drummond 1846 (UC); Punjab, Simla, J. R. Drummond 22635 (UC); Simla, Hügel 719b (W); Bushole, Rampur-Bishahr, Punjab, W. Koelz 3168 (NY, US); Chaura, Tarand-Sarahan, Bashahr State, Punjab, W. Koelz 7410 (NY). **West Punjab:** "Chandrakain" [Chandigarh], Kulu, Punjab, W. Koelz 129 (NY, US); Kulu, Punjab, Naggar, W. Koelz 1789 (NY); Kothi, Kulu, Mohindar Nath 11 (NY). **Sikkim:** Sikkim, J. D. Hooker & T. Thomson s.n. (W). **Uttar Pradesh:** on way to Rifle range, Chakrata, Dehradun, I. Kamini in 1961 (CANB); Chakrata, M. B. Raizada in 1937 (S); Mussoorie, H. Singh & S. Jalan in 1960 (AAU); Mussoorie, Jabberkhet, R. R. Stewart 17166 (NY). **Unknown:** E Himalayas, K. Biswas 3508 (NY); Ganges Valley, above Jalla, J. F. Duthie 1739 (W); W Himalayas, J. F. Duthie 19884 (W), E Himalaya, Griffith 3330/1 (NY, W); Himalayas Bor., J. D. Hooker & T. Thomson s.n. (C, M, S, W); Dhakuri Pass, W. Koelz in 1948, n. 20156? (NY); "Gulwarg" [Godwar], G. D. Sawson 15337 (MO, NY, UC, US); s. loc., Sharp s.n. (W); NW Himalayas, Stolitzka in 1864 (W). KASHMIR. Lidder Valley, J. F. Duthie 25653 (UC); J. D. Hooker & T. Thomson s.n. (W); Charehan, Patriata Murrel Hills, R. R. Stewart 5203 (NY); Sonamarg, R. R. Stewart 6836 (NY); Aru-Nafran, upper Lidder Valley, R. R. Stewart 13506 (PENN); Sonamarg, Aug. 1978, R. R. Stewart s.n. (NY). NEPAL. Phulung Ghyang, Gossainkunda, R. Maser 118 (US); "India orientale," Wallich in 1821 (GH photo LP). PAKISTAN. "Hochwald oberhalb Shogran," Kaghantal, E. J. Ecker 131 (W); Hazara, Kaghan, S. M. A. Kazmi in 1965 (M); Changla Gali, Murrie Hills, R. R. Stewart 10100B (NY); Hazara, Changla Gali, R. R. Stewart 27535 (W).

3. *Ainsliaea bonatii* Beauverd, Bull. Soc. Bot. Genève, Sér. 2, 1: 377. 1909. TYPE: China. Yunnan: "Yu nan sen," Tsong-chan, s.d., F. Ducloux 3646 (type, NY!). Figures 14, 15.

Ainsliaea pteropoda var. *platyphylla* Franch., J. Bot. (Desvaux) 2: 69. 1888. Syn. nov. TYPE: China.



Figure 11. *Ainsliaea bonatii* Beauverd var. *bonatii*. —A. Habit. —B–D. Foliar trichomes. —E. Phyllaries. —F. Chasmogamous floret. —G. Stamen. —H. Style branches. Scale bars: A = 3 cm; B, C = 0.05 mm; D = 0.1 mm; E = 2 mm; F = 5 mm; G, H = 1 mm. Drawn from A, E–H, *Henry 9955* (MO); B–D, *Ducloux 3646* (NY).



Figure 15. *Ainsliaea bonatii* var. *multibracteata* (Mattf.) S. E. Freire. —A. Habit. —B. Cleistogamous floret. Scale bars: A = 3 cm; B = 2 mm. Drawn from *Smith 4745* (S).

Yunnan: Mo-Che-Tcho tze, 3 Oct. 1882, *J. M. Delavay* 607 (lectotype, designated here, P!).

Ainsliaea bonatii var. *glabra* Beauverd, Bull. Soc. Bot. Genève, Sér. 2, 1: 377. 1909. TYPE: China. Yunnan: "Yu nan," Oct. 1906, *E. E. Maire* 260 (holotype, P not seen).

Ainsliaea bonatii var. *arachnoidea* Beauverd, Bull. Soc. Bot. Genève, Sér. 2, 1: 378. 1909. TYPE: China. Yunnan: "Yu nan sen," 28 Oct. 1903, *F. Ducloux* 253 (type, UC!).

Plants perennial, herbaceous, 0.20–0.70 m tall; stems erect, unbranched, loosely lanuginose. Leaves basally clustered, rosulate, longly petiolate with petioles broadly winged slightly narrowed to the base; leaf blades chartaceous, ovate to deltoid, cordate at the base, margins obscurely denticulate; upper surface sparsely strigose and lower surface white-strigose to lanate, with a combination of the following trichome types: short glandular biseriate trichomes, long crisped trichomes, and scattered long straight trichomes, ca. 2 mm; palmati-pinnate, 5- to 7-nerved. Capitula sessile, arranged in a stachyoid inflorescence; involucre 5- or 6-seriate, cylindrical, 10–13 × 3–4 mm; phyllaries papyraceous, apically strigose; outer phyllaries ovate, acute, 1.5–2 × 1–1.3 mm; inner phyllaries linear to oblong, acute, midvein dark, 10–13 × 0.6–1.2 mm. Florets 3(4), hermaphrodite, chasmogamous and cleistogamous (at different seasons or in single plant); corollas white; *chasmogamous florets* with corollas ligulate, (7)11–13.5 mm, lobes 0.5–5 mm (deeper slit (3)6–7.5 mm), tube (4)5–6 mm; anthers purple, 4.5–5 mm, apical appendages truncate, ca. 1 mm, sagittate; tails 1.5–1.8 mm, smooth to slightly pilose; style branches short, truncate, ca. 0.4 mm. Achenes oblong, 4–6 mm, densely pilose, 10-nerved; pappus bristles ca. 32, 5–8 mm; *cleistogamous florets* with corollas tubulose to pseudoligulate, 3–4 mm, 4- or 5-lobed, lobes 0.2 mm (deeper slit 0.3 mm); anthers ca. 1 mm; style branches ca. 0.7 mm. Achenes ca. 6 mm; pappus bristles ca. 32, 6–7 mm.

Distribution. China (Sichuan and Yunnan), at elevations between 2400 and 3500 m (Fig. 3B).

Discussion. Franchet (1888: 69) mentioned two syntypes in the protologue of *Ainsliaea pteropoda* var. *platyphylla*, "Mo-Che-Tcho tze, 3 Oct. 1882, *J. M. Delavay* 607" and "Mo-che-Tchin, supra Tapin-tze, 30 Nov. 1886, *J. M. Delavay* 1029." I selected as lectotype *J. M. Delavay* 607 kept at P, since I was unable to see the syntype *J. M. Delavay* 1029.

Ainsliaea pteropoda var. *platyphylla* is placed into synonymy of *A. bonatii* Beauverd because there is no diagnostic character that differentiates the former from the latter.

Relationships. *Ainsliaea bonatii* most resembles *A. latifolia*. Both species have leaves broadly petiolate

and lanose below (with long crisped trichomes). However, they may be differentiated by leaf bases, i.e., the leaves are rounded at the base in *A. latifolia*, whereas *A. bonatii* has cordate leaves.

Key to the varieties of *Ainsliaea bonatii* in China

- 1a. Leaf blade broadly ovate to orbicular . . . 3a. var. *bonatii*
1b. Leaf blade narrowly ovate . . . 3b. var. *multibracteata*

3a. *Ainsliaea bonatii* Beauverd var. *bonatii*. Figure 14.

Stems with few leaves much reduced. Leaf blades broadly ovate to orbicular, 6–11.5 × 5–11.5 cm, apex acute to subobtuse; petioles 5–19 cm × 4–18 mm (at the upper point). Flowers usually chasmogamous, occasionally florets cleistogamous at the apex of the stem.

Distribution and phenology. Wet places on rocks under mixed conifer forest, between 2400 and 3000 m, from China (Sichuan and Yunnan); collected in flower in October and November.

Representative specimens examined. CHINA. **Sichuan:** 911 Forestry Center, 26 Aug. 1983, *s. coll.* 46 (HITBC); Muli Co., Lailuo, 1 Oct. 1983, *s. coll.* (HITBC 076240). **Yunnan:** "Luqiann" [Luquan] Co., Mt. Mumunshan, *Y. P. Chang* 0694 (HITBC); Mo-che-Tchin, supra Tapin-tze, *J. M. Delavay* 1029 (paratype of *Ainsliaea pteropoda* var. *platyphylla*, P not seen); Mi lê, *A. Henry* 9955 (MO, NY); "Yu-nan-sen" [Hsiang-Yun], *E. E. Maire* 920 (C, UC), *E. E. Maire* 2349 (UC); Yunnan, W of Talifu, Mekong watershed, rt. to Youngchang & Tengyueh, *J. F. Rock* 6679 (US); S Yunnan, "Molangpo bei Yüendjiang," *H. v. Wissmann* 425 (W). **Unknown:** W. Yunchiang, *E. A. Wilson* 183 (W).

3b. *Ainsliaea bonatii* var. *multibracteata* (Mattf.) S. E. Freire, comb. et stat. nov. Basionym: *Ainsliaea multibracteata* Mattf., Notizbl. Bot. Gart. Berlin-Dahlem 11: 106. 1931. TYPE: China. Sichuan: Sze-chuan, Nanch'uan, 14 Oct. 1891, *C. Bock et A. v. Rosthorn* 1220 (lectotype, designated here, O!; duplicate, W!). Figure 15.

Ainsliaea maffeldiana Hand.-Mazz., Acta Horti Gothob. 12: 347. 1938. Syn. nov. TYPE: China. Sichuan: Sze-chuan, Drogochi, in silva mixta, 3400–3500 m, 26 Sep. 1922, *H. Smith* 4745 (holotype, W!; isotype, S!).

Stems leafy with reduced alternate leaves petiolate to sessile. Leaf blades narrowly ovate, 8.5–11 × 5–6 cm, apex acute; petioles 5–13 cm × 6–8 mm (at the upper point); cauline leaves alternate, petiolate to sessile, ovate to ovate-lanceolate. Flowers usually cleistogamous.

Distribution and phenology. At present known only from type collections from China (Sichuan),

between 3400 and 3500 m; flowering in September and October.

Discussion. *Ainsliaea bonatii* var. *multibracteata* is given varietal status because it possesses narrowly ovate leaves; otherwise it is typical of the species. Because no herbarium was mentioned for type collection of *A. multibracteata*, I propose the specimen kept at O as lectotype, which presents the most complete plant.

Ainsliaea mattenfeldiana was described on the basis of its ovate leaves and cleistogamous florets (vs. broadly ovate leaves and chasmogamous florets in *A. bonatii*). *Ainsliaea mattenfeldiana* is proposed here as a new synonym of *A. multibracteata* Mattf. (= *A. bonatii* var. *multibracteata*) because there is no diagnostic character that differentiates the former from the latter. In addition, cleistogamous florets is a variable feature within the range of *A. bonatii*.

4. *Ainsliaea brandisiana* Kurz, J. Asiat. Soc. Bengal 41(2): 318. 1872, non *Ainsliaea brandisiana* Koyama, Acta Phytotax. Geobot. 32: 60. 1981. TYPE: Myanmar. Martaban, s.d., S. Kurz 865 (holotype, G!). Figure 16.

Plants perennial, herbaceous, 0.45–0.90 m tall; stems erect, unbranched below the inflorescence, naked and strigose. Leaves basally clustered, rosulate, long-petiolate; petioles wingless, conspicuously strigose, 7–14 cm; leaf blades chartaceous, oblong to elliptic, 10–12 × 4.5–6 cm, obtuse to subobtuse at the apex, base cordate, margins obscurely denticulate; upper surface sparsely strigose, lower surface strigose, with 3-seriate straight trichomes; palmate-pinnate, 3-nerved. Capitula long-pedunculate, arranged in thyrsoïd inflorescence; involucre 5-seriate, campanulate, ca. 10 × 5 mm; phyllaries papyraceous, dorsally with glandular trichomes; outer phyllaries ovate, acuminate, ca. 3 × 0.4 mm; inner phyllaries linear to lanceolate, acute, 3- to 5-nerved, ca. 10 × 0.5 mm, acute. Florets 5, hermaphrodite, chasmogamous; corollas (missing, described from the original diagnosis) white, ligulate, ca. 15 mm. Achenes oblong-obovate, 4–5 mm, 10-nerved, densely pilose; pappus bristles ca. 34, ca. 6 mm.

Distribution and phenology. At present *Ainsliaea brandisiana* is only known from the type collection from Myanmar (Martaban) (Fig. 3B); flowering collection without month.

Relationships. *Ainsliaea brandisiana* is most similar to *A. spanocephala*. Both species have capitulum of five florets, leaf blades oblong to elliptic and foliar trichomes 3-seriate. However, *A. brandisiana* differs

from this species by its leaf bases cordate (vs. rounded).

5. *Ainsliaea caesia* Hand.-Mazz., Beih. Bot. Centralbl. 56: 469. 1937. TYPE: China. Guangdong: Kwangtung, “in montibus Lungtou-schan 60 km ad orientem urbis Siudsao” [Schautschou], 900 m, 8 Oct. 1917, R. Mell 874 (holotype, WU!). Figure 17.

Plants perennial, herbaceous, ca. 0.80 m tall; stems erect, unbranched, naked, with few leaves much reduced, strigose. Leaves basally clustered, rosulate, short-petiolate; petioles wingless, ca. 1 cm; leaf blades chartaceous, lanceolate, 5–5.5 × 12–13 cm, apex acute, rounded at the base, margins entire to obscurely denticulate; strigose on both surfaces and more dense along the margins with long straight trichomes; palmate-pinnate, 3-nerved. Capitula sessile, arranged in a stachyoid inflorescence; involucre 5- or 6-seriate, cylindrical, ca. 10 × 1.5 mm; phyllaries papyraceous, glabrous; outer phyllaries ovate, acute, ca. 2 × 1 mm; inner phyllaries linear to lanceolate, acute, 3-nerved, 10–13 × ca. 1.5 mm. Florets 3, hermaphrodite, cleistogamous; corollas tubulose to pseudoligulate, ca. 4 mm, lobes ca. 0.3 mm (deeper slit 0.5 mm); anthers ca. 2.5 mm, apical appendages truncate, ca. 0.4 mm, sagittate; tails ca. 1 mm, shortly pilose; style branches short, truncate, ca. 0.5 mm. Achenes oblong, ca. 1.5 mm, 10-nerved, glabrous; pappus bristles uniseriate, ca. 30, 7–8 mm.

Distribution and phenology. At present *Ainsliaea caesia* is only known from the type collection from China (Guangdong). It was collected on mountain slopes along river margins, on granitic soils at 900 m; flowering in October.

Relationships. *Ainsliaea caesia* resembles *A. glumacea* and *A. mairei* in its basal rosettes of leaves with narrow blades. However, *A. caesia* differs principally by its lanceolate leaf blades (vs. obovate in *A. glumacea* and elliptic in *A. mairei*) and leaves short-petiolate (vs. sessile in *A. glumacea* and *A. mairei*).

6. *Ainsliaea cavaleriei* H. Lév., Fl. Kouy-Tchéou: 82. 1914. TYPE: China. Sud de Tin-fan, Nov. 1904, J. Cavalerie 1907 (holotype, E!). Figure 18.

Ainsliaea cleistogama C. C. Chang, Sinensia 4: 225. 1934. Syn. nov. TYPE: China. Guangdong: Kwangtung, Tai Young Mt., 19 July 1921, 700 m, F. A. McClure 459 (holotype, K not seen; isotype, NY!).

Plants perennial, herbaceous, 0.25–0.80 m tall; stems erect, unbranched below the inflorescence,

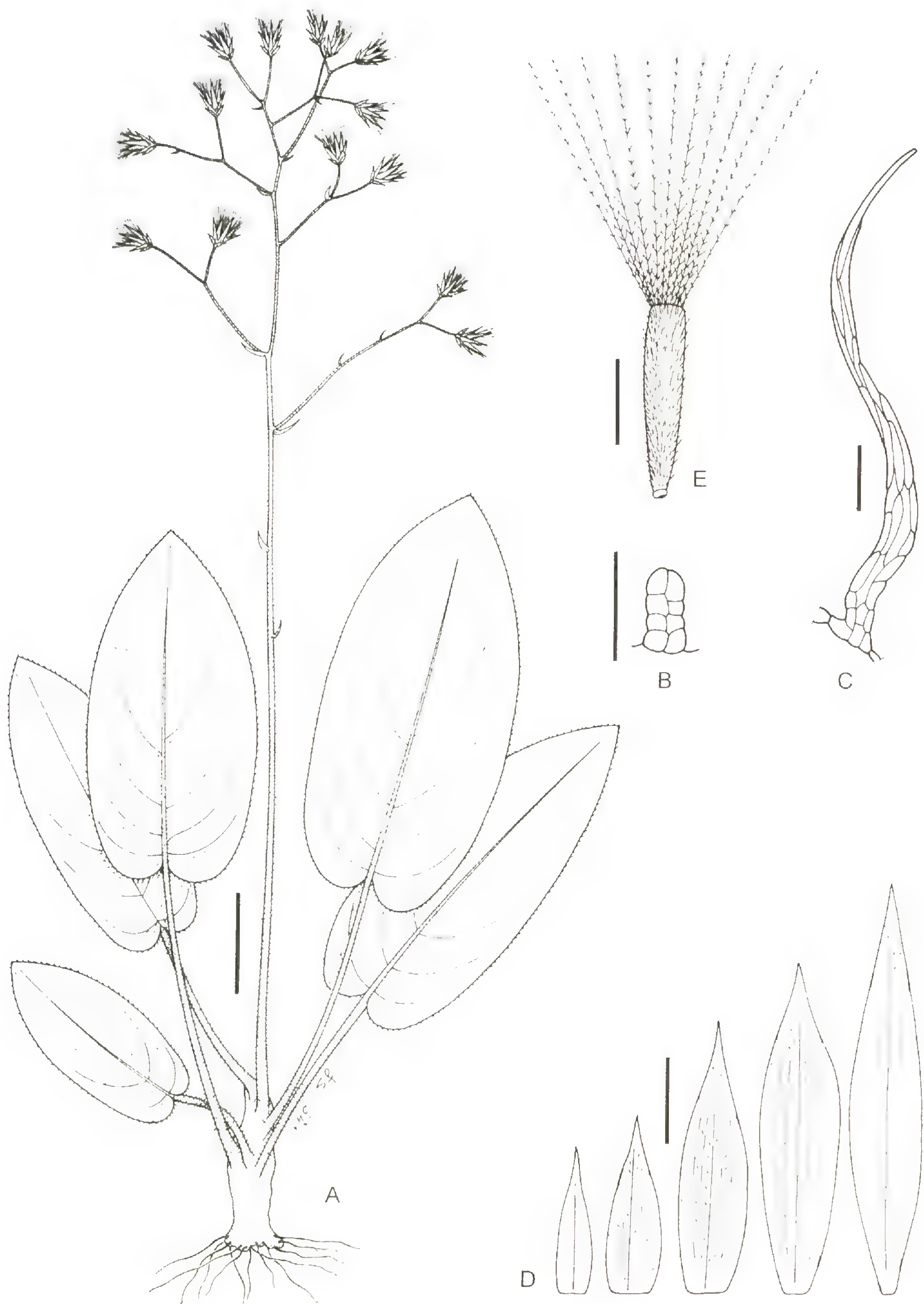


Figure 16. *Ainsliaea brandisiana* Kurz. —A. Habit. —B. Trichome of phyllaries. —C. Foliar trichome. —D. Phyllaries. —E. Achene with pappus. Scale bars: A = 3 cm; B = 0.05 mm; C = 0.1 mm; D, E = 2 mm. Drawn from the holotype Kurz 865 (G).



Figure 17. *Ainsliaea caesia* Hand.-Mazz. —A. Habit. —B. Foliar trichome. —C. Capitulum. —D. Phyllaries. —E. Cleistogamous floret. —F. Stamen. —G. Style branches. Scale bars: A = 3 cm; B = 0.1 mm; C = 5 mm; D = 4 mm; E = 2 mm; F, G = 1 mm. Drawn from the holotype *Mell 874* (WU).



Figure 18. *Ainsliaea cavaleriei* H. Lév. —A. Habit. —B. Capitulum. —C. Phyllaries. —D. Foliar trichome. —E–H. Cleistogamous floret: E, corolla; F, stamen; G, style branches; H, achene with pappus. Scale bars: A = 3 cm; B = 5 mm; C = 2 mm; D = 0.1 mm; E = 1 mm; F, G = 0.5 mm; H = 2 mm. Drawn from *Steward & Cheo 1090* (S).

naked, with few leaves reduced, or scarcely leafy, strigose. Leaves basally clustered, rosulate, long-petiolate with petioles wingless, conspicuously strigose, (1.5)3–10 cm; leaf blades chartaceous, ovate to oblong, 4–13 × (0.5)3–7 cm, acute to subobtusate at the apex, base deeply cordate, margins obscurely denticulate; with upper surface sparsely strigose, and lower surface reddish-strigose, especially on the nerves (with long straight trichomes ca. 1.5 mm); palmate-pinnate, 3- to 5-nerved; cauline leaves (when present) similar to the radical, 17–30 × 9–16 mm, shortly petiolate and cuneate at the base. Capitula sessile or shortly pedunculate, arranged in thyrsoid inflorescence; involucre 5- or 6-seriate, cylindrical, 6–10 × 3–5 mm; phyllaries papyraceous, purple, strigose above; outer phyllaries ovate, acuminate at the apex, 2–2.5 × ca. 1 mm; inner phyllaries linear to elliptic, acute, 3- to 5-nerved, 6–10 × ca. 1 mm. Florets 3, hermaphrodite cleistogamous; corollas white, tubulose to pseudoligulate, 3–3.5 mm, 5-lobed (deeper slit 0.3–1.5 mm); anthers ca. 1.5 mm, apical appendages shortly apiculate, ca. 0.3 mm, sagittate; tails ca. 0.5 mm, shortly pilose; style branches short, rounded, ca. 0.4 mm. Achenes oblong-elliptic, 3–4 mm, 9-nerved, densely pilose; pappus bristles 28 to 34, ca. 6 mm.

Distribution and phenology. Southern China (Guangdong, Guangxi, Jiangxi) in moist slopes between 380 and 1050 m; collected in flower from May to July and from October to December, in flower bud in April and September.

Discussion. I propose to place *Ainsliaea cleistogama* into synonymy of *A. cavaleriei*, because there is no character that differentiates the former from the latter.

Relationships. *Ainsliaea cavaleriei* most resembles the species complex with *A. fragrans*, *A. ramosa*, and *A. rubrinervis*. This complex and *A. fragrans* share leaves ovate to oblong, deeply cordate at the base, and with villous petioles. However, *A. cavaleriei* can be differentiated by its apical anther appendages that are apiculate and its phyllaries strigose above.

Representative specimens examined. CHINA. **Guangdong:** Canton, L. Deng 8023 (MO); Canton, L. Deng 8878 (MO); Huaiji, K. L. Shi 15077 (AAU); Sha Lo Shan, Wa Mei Tong Village, Sin-fung district, Y. W. Taam 113 (MICH, US); Conghua Co., near Sanchuan hydroelectric station, X. W. Wang et G. C. Zhang 8241 (MO). **Guangxi:** Guangxi, D. Chen 425 (MO); Guangxi, S. Q. Chen 14753 (MO); Guangxi, S. Q. Chen 17243 (MO); Guangxi, Ta Tseh Tsuen, Yung Hsien, A. N. Steward & H. C. Cheo 1090 (NY, S, W); Guangxi, F. Wei 230 (MO). **Jiangxi:** “Kiangsi,” Yut Chi Fa, Oo Chi Shan near Lam Uk Tung Village, Lungnan district, S. K. Lau 4554 (S, US). **Unknown:** Q. Lu & Y. Wei 20097 (MO).

7. *Ainsliaea chapaensis* Merr., J. Arnold Arbor. 21: 387. 1940. TYPE: Vietnam. Tonkin: Chapa, 1500 m, Apr. 1938, A. Pételot 2068 (holotype, GH not seen; isotypes, MO!, NY!, US!). Figure 19.

Plants perennial, herbaceous, 0.18–0.35 m tall; stems erect, shortly unbranched below the inflorescence, leafy, strigose. Leaves basally clustered, rosulate, long-petiolate, petioles wingless, 1.5–4.5 cm, strigose subglabrate at maturity; leaf blades subcoriaceous, ovate, 2.5–4.5 × 1.5–3 cm, apex acute to shortly acuminate, base broadly rounded, margins obscurely denticulate; subconcolorous, upper surface green-olivaceous, subglabrous, lower surface paler, moderately strigose, especially on veins, with long straight trichomes and short glandular trichomes; palmate-pinnate, 3-nerved; cauline leaves alternate, short-petiolate to sessile, ovate to lanceolate or elliptic, gradually reduced upward to the base of inflorescence. Capitula sessile, arranged in a stachyoid inflorescence; involucre 5- or 6-seriate, cylindrical, ca. 10 × 5 mm; phyllaries subcoriaceous, strigose; outer phyllaries ovate, acuminate at the apex, 1.5–2.5 × ca. 1 mm; inner phyllaries linear to lanceolate, acute, 3-nerved, 7.5–9 × 1.5–3 mm. Florets 3 to 4, hermaphrodite, chasmogamous; corolla ligulate, ca. 9 mm, lobes 2–3 mm long (deeper slit ca. 4 mm), tube ca. 5 mm; anthers 3.5–4 mm, apical appendage rounded, ca. 0.5 mm; sagittate, tails ca. 1.5 mm, shortly pilose; style branches short, rounded, ca. 0.5 mm. Achenes oblong to obovate, 2.5–3 mm, 10-nerved, densely pilose; pappus bristles ca. 28, 6–7 mm.

Distribution and phenology. At present is only known from the type collection from Vietnam, on very dry slopes in full sunlight, between 1500 and 1900 m (Fig. 3B); flowering in April.

Relationships. *Ainsliaea chapaensis* resembles *A. parvifolia* in its long-petiolate leaves, with the leaf blades ovate and capitula sessile. *Ainsliaea chapaensis* is distinguished by its leaf blades broadly rounded at the base (vs. cuneate) and its phyllaries strigose (vs. glabrous).

8. *Ainsliaea crassifolia* C. C. Chang, Sinensia 6(5): 549. 1935. TYPE: China. Yunnan: Yung-pe Mtns., 26°45'N, 10,000 ft., Sep. 1913, G. Forrest 11070 (lectotype, designated here, E not seen; duplicates, E photo LP!, PE!). Figure 20.

Plants perennial, herbaceous, 0.60–0.75 m tall; stems erect, unbranched, leafy, densely white-lanuginose. Leaves basally clustered, rosulate, long-petiolate; petioles wingless, 4–11 mm, densely white-



Figure 19. *Ainsliaea chapaensis* Merr. —A. Habit. —B, C. Foliar trichomes. —D. Phyllaries. —E. Capitulum. —F. Chasmogamous floret. —G. Style branches. —H. Stamen. Scale bars: A = 3 cm; B = 0.1 mm; C = 0.05 mm; D, F = 3 mm; E = 5 mm; G, H = 1 mm. Drawn from the isotype *Pételot 2068* (MO).

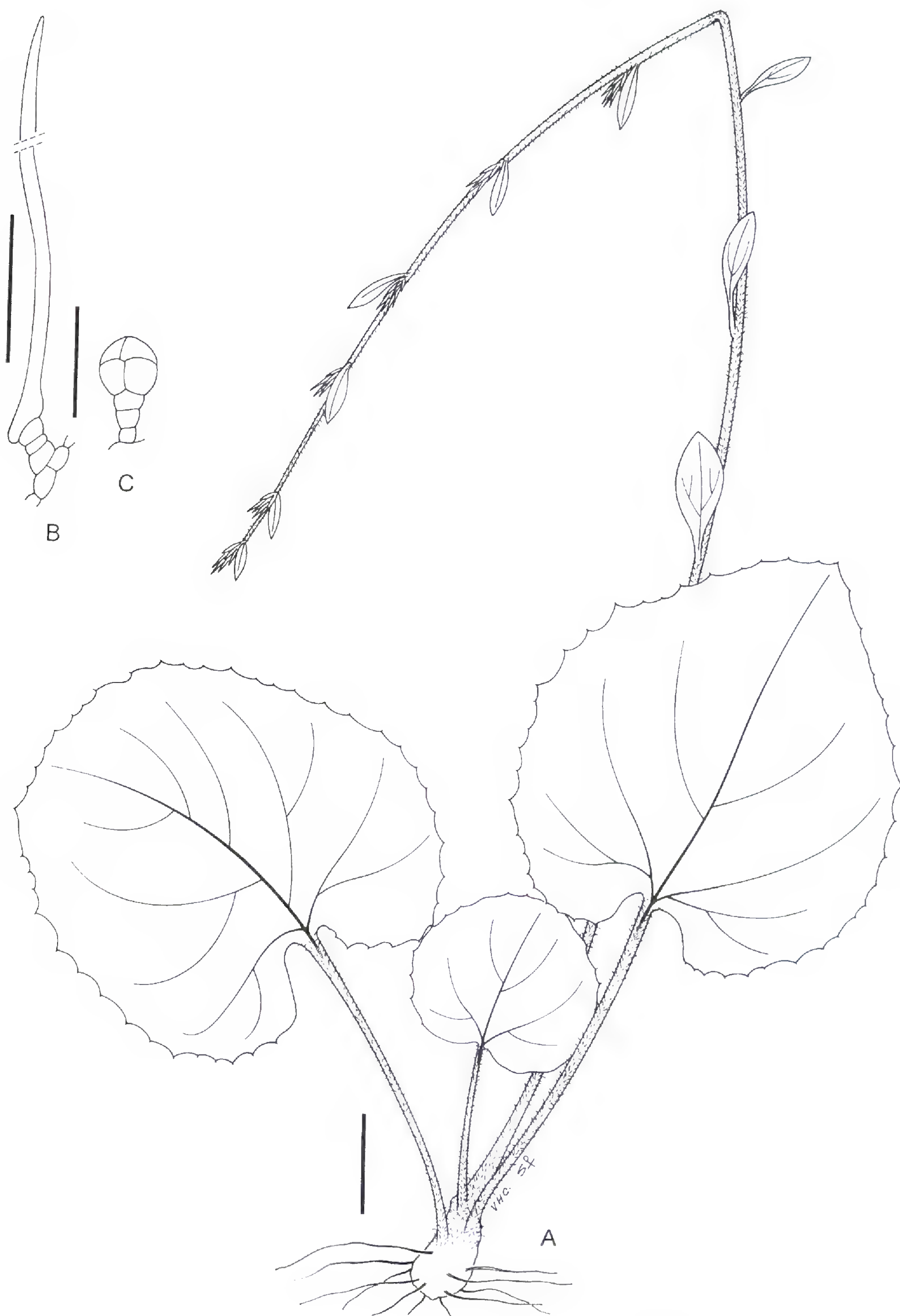


Figure 20. *Ainsliaea crassifolia* C. C. Chang. —A. Habit. —B, C. Foliar trichomes. Scale bars: A = 3 cm; B = 0.1 mm; C = 0.05 mm. Drawn from the lectotype *Forrest 11070* (PE).

lanuginose; leaf blades chartaceous, reniform, 9–13 × 6–12 cm, apex obtuse to rounded, base deeply cordate, margins dentate; strongly discolorous, with upper surface deep green, sparsely lanate, and lower surface densely white-lanate, with long crisped trichomes and capitate glandular trichomes; palmati-pinnate, 3- to 5-nerved. Cauline leaves alternate, ovate, ca. 5 × 3.5 cm, petiolate, petioles ca. 5 cm, gradually reduced upward to the base of the inflorescence. Capitula sessile, arranged in a stachyoid inflorescence; involucre papyraceous, glabrous.

Distribution and phenology. *Ainsliaea crassifolia* is only known from China (Yunnan and Sichuan), growing at 3000 m in open pasture on the margins of pine forest and in shady stony pasture beneath cliffs; only known from immature collections (September).

Discussion. Chang (1935) mentioned two syntypes in the protologue of *Ainsliaea crassifolia*, “Tong-shan in the Yangtze bend, Sep. 1913, *G. Forrest 11319*” and “Yung-pe mountains, Sep. 1913, *G. Forrest 11070*” kept at E. I have seen a duplicate of the syntype *G. Forrest 11070* at PE, which is in accordance with the protologue, so I selected the specimen *G. Forrest 11070* at E as lectotype.

Relationships. Although the floral characters of *Ainsliaea crassifolia* are unknown (also absent in the original diagnosis), it closely resembles the genus *Ainsliaea* in habit, leaves, and foliar trichomes, so the species is referred here, until further study.

Representative specimens examined. CHINA. **Sichuan:** Muli Co. at the bank of Donglanghe, *s. coll.* (HITBC 076241); **Yunnan:** Tong-shan in the Yangtze bend, *G. Forrest 11319* (paratype, E not seen).

9. *Ainsliaea elegans* Hemsl., Hooker's Icon. Pl. 28(2): t. 2747. 1902, non *Ainsliaea elegans* Hayata, Bot. Mag. (Tokyo) 20: 14. 1906. TYPE: China. Yunnan: Mengtze, 7000 ft., *A. Henry 9108* (lectotype, designated here, K!; duplicates, MO!, NY!). Figures 21, 22.

Pertya esquirolii H. Lév., Bull. Acad. Int. Géogr. Bot. 24(295–297): 251. 1914. TYPE: China. Guizhou: Kouy-Tcheou [Kweichow], Ta Pin et Than lo, 1150 m, Dec. 1912, *J. Esquirol 3633* (holotype, E!).

Ainsliaea elegans var. *tomentosa* Matf., Notizbl. Bot. Gart. Berlin-Dahlem 11(102): 107. 1931. TYPE: China. Guizhou: Kouy-Tcheou [Kweichow], Ta Pin et Than lo, 1150 m, Dec. 1912, *J. Esquirol 3633* (holotype, E!).

Plants perennial, herbaceous, 0.30–0.70 m tall; stems erect, unbranched below the inflorescence, villose. Leaves basally clustered, rosulate, long-petiolate with petioles wingless, conspicuously villose, (6)16–30 cm long; leaf blades subcoriaceous, ovate to

deltoid, (10)13.5–17.5 × 6.5–13 cm, acute to sub-obtuse at the apex, base deeply cordate, margins obscurely denticulate; palmati-pinnate, 3- to 5-nerved. Capitula sessile or shortly pedunculate, arranged in thyrsoid inflorescence; involucre 5- or 6-seriate, cylindrical, 12–13 × 4–5 mm; phyllaries subcoriaceous, dorsally pilose; outer phyllaries ovate, acute, ca. 4 × 1.5 mm; inner phyllaries linear to elliptic, shortly acuminate, midvein dark, ca. 12 × 2 mm. Florets 2 (very occasionally in the same plant capitula with 3 florets), hermaphrodite, chasmogamous; corollas white or pink, ligulate, ca. 16 mm, lobes ca. 7.5 mm (deeper slit ca. 9 mm), tube ca. 7 mm; anthers purple, ca. 6 mm, apical anther appendages rounded to slightly emarginate, 1.5 mm, sagittate; tails ca. 2 mm, shortly pilose; style branches short, truncate, ca. 0.4 mm. Achenes oblong, ca. 3 mm, 10-nerved, densely pilose; pappus bristles ca. 30, ca. 7.5 mm.

Distribution. Southern China (Guizhou, Yunnan) and Vietnam (Chapa), between 1150 and 2500 m (Fig. 4B).

Discussion. Two syntypes are mentioned in the protologue of *Ainsliaea elegans*, “*Henry 9108*” and “*Henry 9108A*.” Both were collected at Mengtze, Yunnan (China), between 7000 and 8000 ft. I found the syntypes “*Henry 9108*” kept at K, MO, and NY, which are in complete accordance with the protologue. According to Stafleu and Cowan (1979), Hemsley's material can be found in K, so I choose as lectotype the specimen deposited at this herbarium.

Key to the varieties of Ainsliaea elegans in China and Vietnam

- 1a. Leaves densely white strigose-lanate on lower surface 9a. var. *elegans*
- 1b. Leaves strigose on both surfaces 9b. var. *strigosa*

9a. *Ainsliaea elegans* Hemsl. var. ***elegans***. Figure 21.

Stem naked, with few leaves reduced. Leaves strongly discolored, with lower surface white strigose-lanate with two trichome types, long crisped trichomes and long straight trichomes, and the upper surface dark green, with long straight trichomes only.

Distribution and phenology. Southern China (Guizhou, Yunnan) in mixed forest between 1150 and 1900 m; collected in flower bud from October to December (flowering collections without date).

Relationships. *Ainsliaea elegans* var. *elegans* resembles *A. fragrans*. Both species have leaves deeply cordate at the base, villose petioles, and rounded



Figure 21. *Ainsliaea elegans* Hemsl. var. *elegans*. —A. Habit. —B, C. Foliar trichomes. —D. Phyllaries. —E. Capitulum. —F. Chasmogamous floret. —G. Stamen. —H. Style branches. Scale bars: A = 3 cm; B, C = 0.1 mm; D, E, F = 5 mm; G = 2 mm; H = 1 mm. Drawn from: A, C–H, *Henry 9108* (NY); B, *Wang 82572* (KUN).

anther appendages. *Ainsliaea elegans* var. *elegans* is distinguished by its ovate to deltoid leaves (vs. ovate to oblong), with blades densely white tomentose on the lower surface (vs. commonly purplish) and its capitulum of two florets (vs. three florets).

Representative specimens examined. CHINA. **Yunnan:** Mengtze, *Henry 9108A* (paratype of *Ainsliaea elegans*, not seen); Mar-li-po, Kwang-jin-in, *K. M. Feng 12964* (KUN); S Yunnan, Molangpo bei "Yuendjiang" [Yuanjiang], *H. v. Wissmann 456* (W); "Y. Ping-bien Hsien" [Pingbian], Ji-mu-te, ta-nei-shan, *C. W. Wang 82572* (KUN).

9b. *Ainsliaea elegans* Hemsl. var. *strigosa* Mattf., Notizbl. Bot. Gart. Berlin-Dahlem 11(102): 107. 1931. TYPE: China. Yunnan: Mengtze, 8000 ft., *A. Henry 10891* (lectotype, designated here, MO!; duplicate, NY!). Figure 22.

Stem leafy. Leaves concolorous, strigose on both surfaces (with long straight trichomes); cauline leaves similar to the basal, shortly petiolate, gradually reduced upward to the base of the inflorescence.

Distribution and phenology. Southern China (Yunnan) and Vietnam (Chapa) in forest. It was collected at higher elevations than variety *elegans*, between 1800 and 2500 m (vs. 1150–1900 m); flowering in February.

Discussion. The protologue of this taxon includes two specimens. The first was collected at "Yunnan, Mengtze, *A. Henry 10891*" (China) and the second at "Tonkin, Chapa, 1800 m, Feb. 1930, *A. Pételot 3724*" (Vietnam). Even though both specimens totally agree with the protologue, I selected as the lectotype of *Ainsliaea elegans* var. *strigosa* the specimen collected by Henry at Yunnan, deposited at MO, which presents the most complete plant.

Relationships. *Ainsliaea elegans* var. *strigosa* is distinct from *A. elegans* var. *elegans* by its blade abaxial surface strigose (vs. tomentose).

Representative specimen examined. VIETNAM. **Chapa:** Tonkin, *A. Pételot 3724* (paratypes, C, NY, US).

10. *Ainsliaea foliosa* Hand.-Mazz., Acta Horti Gothob. 12: 348. 1938. TYPE: China. [Sichuan?]: Sikang, "inter Taining (Ngata) et Taofu (Dawo), Sunglingku, in silva abietina primaeva," 3700 m, 13 Sep. 1934, *H. Smith 12120* (holotype, W!; isotypes, MO!, S!). Figure 23.

Plants perennial, herbaceous, 0.45–0.80 m tall; stems erect, unbranched, leafy, loosely lanuginose. Leaves alternate, approximate above the base, long-

petiolate, petioles winged, 4–5.5 cm long, becoming gradually reduced, sessile and distantly spaced upward to the capitulescence; leaf blades chartaceous, ovate to elliptic, 5–8 × 2–3 cm, acute at the apex, base rounded abruptly to slightly narrowly into the petiole, margins obscurely denticulate; slightly discolored, upper surface green-olivaceous, subglabrous, lower surface paler, laxly lanate with long crisped trichomes and glandular biseriate trichomes or with long straight trichomes only; palmate-pinnate, 3-nerved. Capitula sessile, arranged in a stachyoid inflorescence; involucre 4- or 5-seriate, cylindrical, ca. 10 × 3.5 mm; phyllaries papyraceous, glabrous, or sparsely pilose, purple; outer phyllaries ovate, acute, 2–3 × ca. 1.2 mm; inner phyllaries ovate to lanceolate, acute, usually midvein dark, ca. 10 × 0.8 mm. Florets ca. 4, hermaphrodite, chasmogamous and cleistogamous (at different seasons); *chasmogamous florets* with corolla pink, ligulate, 8–9 mm, lobes 3.5–4 mm (deeper slit 4.5–5 mm), tube 3.5–4 mm; anthers ca. 4 mm, apical appendages obtuse, ca. 0.7 mm, sagittate; tails 1–1.5 mm, shortly pilose; style branches truncate, ca. 0.4 mm. Achenes ca. 2 mm, densely pilose, 9-nerved; pappus absent; *cleistogamous florets* with corolla purplish above, tubulose to pseudoligulate, ca. 5 mm, minutely 5-lobed; anthers much reduced, ca. 0.5 mm; style branches ca. 0.7 mm. Achenes ca. 4 mm; pappus bristles ca. 30, ca. 5 mm.

Distribution and phenology. China (Yunnan) in woods between 2000 and 3700 m. The type collection may be from Sichuan; collected in flower in September and April, in flower bud in August.

Relationships. *Ainsliaea foliosa* resembles *A. latifolia* in leaves and capitulescence. Both species have leaf blades ovate to elliptic, long-petiolate, petioles winged. The blade surfaces are lanuginose with long crisped trichomes, and the capitula are arranged in spikes. *Ainsliaea foliosa* may be distinguished by its leaves appearing above the base of the stem (vs. a basal rosette).

Representative specimens examined. CHINA. **Yunnan:** Qiubai Co., 6 May 1952, s. coll. (HITBC 076266); Xujiaba, Jingdong Co., 28 Apr. 1981, s. coll. (HITBC 071881); Langping Co., 2 Aug. 1976, s. coll. (HITBC 076259).

11. *Ainsliaea fragrans* Champ. ex Benth., Hooker's J. Bot. Kew Gard. Misc. 4: 236. 1852. TYPE: China. Guangdong: Hong Kong, s.d., *J. G. Champion 161* (holotype, K!; isotype, K!). Figure 24.

Ainsliaea rubrifolia Franch., J. Bot. (Morat) 8: 296. 1894. Syn. nov. TYPE: China. Sichuan: Su-tchuen, Tchen-

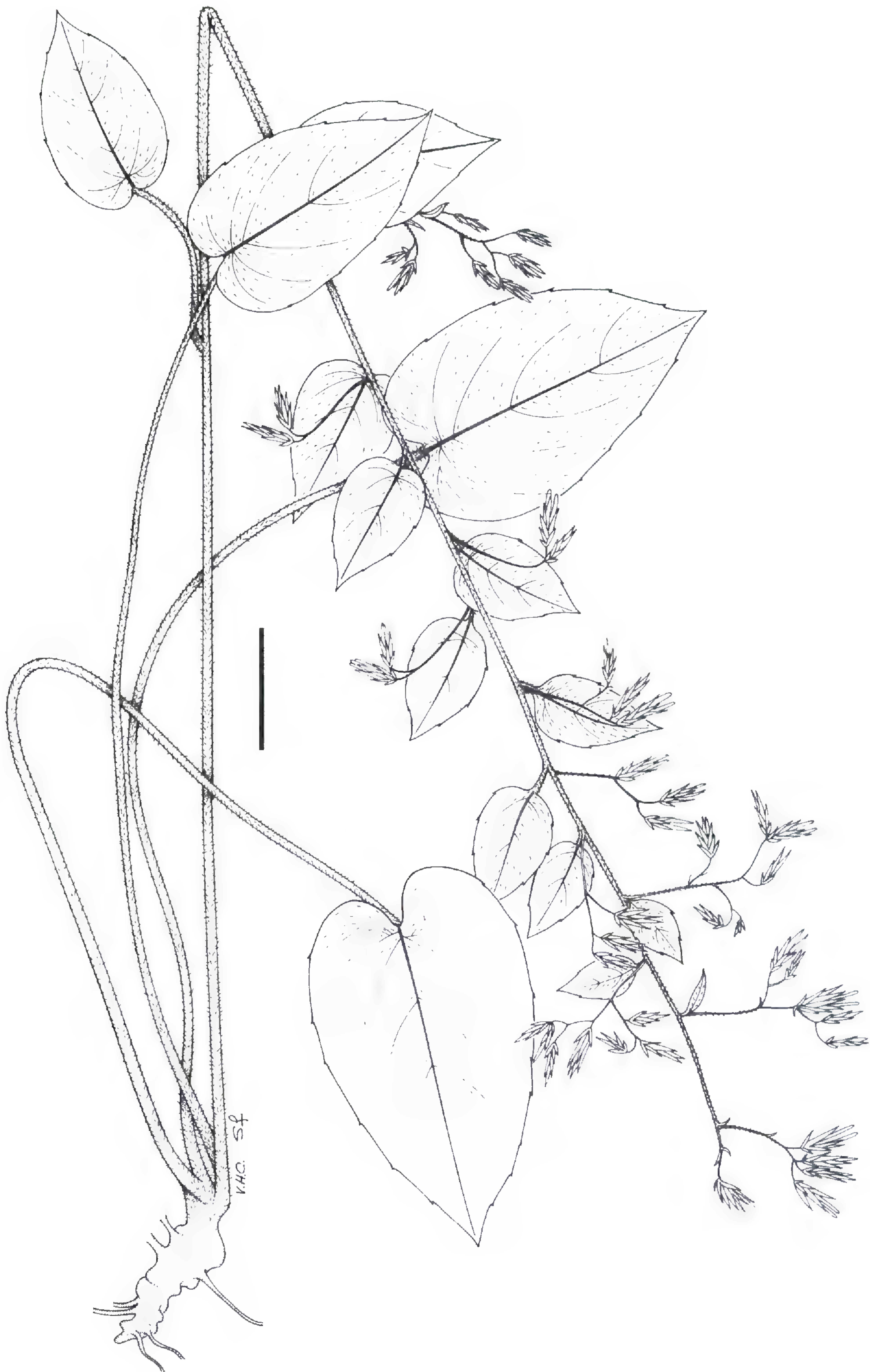


Figure 22. *Ainsliaea elegans* var. *strigosa* Mattf. Scale bar = 3 cm. Drawn from *Henry 10891* (NY).



Figure 23. *Ainsliaea foliosa* Hand.-Mazz. —A. Habit. —B, C. Foliar trichomes. —D. Capitulum. —E. Chasmogamous floret (without stamens and style). —F. Stamen of chasmogamous floret. —G. Style branches of chasmogamous floret. —H. Corolla of cleistogamous floret. —I. Achene with pappus of cleistogamous floret. Scale bars: A = 3 cm; B, C = 0.1 mm; D = 5 mm; E, H, I = 2 mm; F, G = 1 mm. Drawn from: A-D, H, I, the isotype *Smith 12120* (MO); E-G, (HTBC 071881).

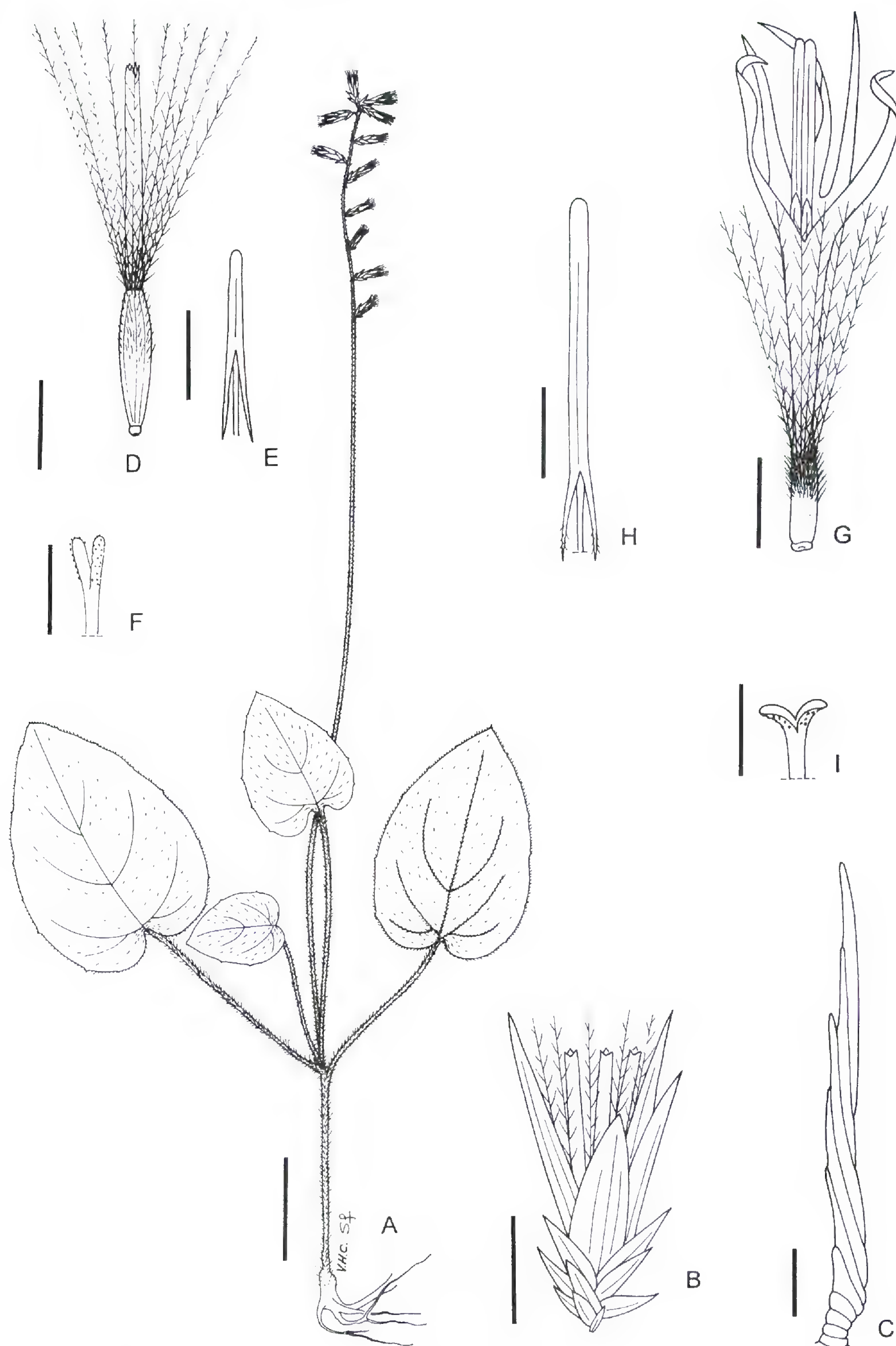


Figure 24. *Ainsliaea fragrans* Champ. ex. Benth. —A. Habit. —B. Capitulum. —C. Foliar trichome. —D. Cleistogamous floret. —E. Stamen of cleistogamous floret. —F. Style branches of cleistogamous floret. —G. Chasmogamous floret. —H. Stamen of chasmogamous floret. —I. Style branches of chasmogamous floret. Scale bars: A = 3 cm; B = 3 mm; C = 0.2 mm; D = 5 mm; E, F = 1 mm; G, I = 1 mm; H = 2 mm. Drawn from: A–C, G–I, *Faber in 1885/86* (S); D–F, *Chow 1978* (NY).

kéou-tin, *R. P. Farges 1034 bis* (holotype, P not seen; isotype, P!)

Ainsliaea cordifolia Franch. & Savat. var. *integrifolia* Maxim., Bot. Jahrb. Syst. 6: 69. 1885. *Ainsliaea integrifolia* (Maxim.) Makino, Bot. Mag. (Tokyo) 22: 167. 1908. *Ainsliaea fragrans* var. *integrifolia* (Maxim.) Kitam., Acta Phytotax. Geobot. 8(1): 67. 1939. Syn. nov. TYPE: Japan. Kyushu: Kumamoto, Higo, Kuma, Pueblo Menda, 25 Nov. 1910, *Y. Narita s.n.* (neotype, designated here, MAK 247989!).

Ainsliaea ningpoensis Matsuda, Bot. Mag. (Tokyo) 27: 236. 1913. Syn. nov. TYPE: China. Zhejiang: Ning-po, Chang 80 (holotype, TI not seen; isotype, TI photo LP!)

Ainsliaea asarifolia Hayata, Icon. Pl. Formos. 8: 71. 1919. Syn. nov. TYPE: Taiwan. Kelung, Apr. 1916, *B. Hayata s.n.* (holotype, TI not seen; isotype, TI photo LP!).

Plants perennial, herbaceous, 0.17–0.75 m tall; stems erect, simple, villose, naked, with few leaves reduced. Leaves clustered, 1–4(9) cm above stem base, long-petiolate with petioles wingless, strigose, 1–10(14) cm long; leaf blades subcoriaceous, ovate to oblong, 3–11.5(15) × 2–5.5(8) cm, acute to subobtuse at the apex, base deeply cordate, margins obscurely denticulate, with upper surface sparsely strigose to subglabrous, and lower surface commonly purple, red-strigose, especially on the nerves (with long straight trichomes ca. 1.5 mm); palmate-pinnate, 3- to 5-nerved. Capitula sessile or shortly pedunculate, arranged in a stachyoid inflorescence; involucre 5- or 6-seriate, cylindrical, 9–13 × ca. 4 mm; phyllaries papyraceous, purple, glabrous; outer phyllaries ovate, acute, ca. 1.5 × ca. 0.5 mm; inner phyllaries linear to elliptic, acute, 3- to 5-nerved, 9–13 × ca. 1.5 mm. Florets fragrant, 3, hermaphrodite, chasmogamous and cleistogamous (at different seasons or in single plant), corollas white; *chasmogamous florets* with corollas ligulate, ca. 10 mm, lobes ca. 4 mm (deeper slit ca. 5 mm), tube ca. 5 mm; anthers purple, ca. 4 mm, apical anther appendages emarginate, 0.7–1 mm, sagittate; tails 1–1.5 mm, shortly pilose; style branches short, truncate, ca. 0.3 mm. Achenes oblong, ca. 2 mm, 10-nerved, commonly pilose above; pappus bristles 26 to 32, ca. 7 mm, white; *cleistogamous florets* with corollas tubulose to pseudoligulate, 5.5–8 mm, 5-lobed, lobes 0.2–0.4 mm (deeper slit ca. 0.8 mm); anthers ca. 2 mm; style branches 0.5–0.6 mm. Achenes 4–5 mm; pappus bristles 9–10 mm.

Distribution and phenology. Central and southern China (Anhui, Fujian, Guangdong, Hubei, Hunan, Jiangsu, Jiangxi, Sichuan, Zhejiang), Japan (Kyushu), and Taiwan. It was collected from a rice terrace, from roadside, in very damp shaded ravines, and in pine forest between 0 and 1300 m (Fig. 4A); flowering from August to December.

Discussion. The type designated in the protologue of *Ainsliaea cordifolia* var. *integrifolia* Maxim.,

“*Kiusiu, Osumi (Tashiro)*,” has not been located at KYO, TI, or MAK, no illustration was published with the name, and no other original material has been found. The specimen “*Y. Narita in 1910*” kept at MAK, which is in accordance with the protologue and matches the locality (Higo) indicated in the protologue of *A. integrifolia* (Maxim.) Makino, is here selected as the neotype.

Ainsliaea asarifolia, *A. integrifolia*, *A. ningpoensis*, and *A. rubrifolia* are proposed here as new synonyms of *A. fragrans* because there is no diagnostic character to separate them as distinct taxa. All of these have petiolate leaves that are ovate to oblong, cordate at the base, with margins remotely callose-denticulate and lanuginose underneath, especially on the veins. In addition, the differential character mentioned in the protologue of *A. rubrifolia*, i.e., leaves reddish green on the abaxial surface, is a variable feature throughout the range of *A. fragrans*.

Relationships. *Ainsliaea fragrans* most resembles the species complex of *A. caveleriei*, *A. ramosa*, and *A. rubrinervis*. This complex and *A. fragrans* share leaves that are ovate to oblong, deeply cordate at the base, and villose petioles. *Ainsliaea fragrans* may be distinguished by its rounded apical anther appendages and its leaves in a whorl near the stem base. Remaining species in this species complex have apiculate anther appendages and leaves in basal rosettes.

Vernacular name. Maruba-teishōsō (Makino, 1908; Kitamura, 1965).

Representative specimens examined. CHINA. **Anhui:** “Anhui,” Wu Yuan, Chang Gou Shan [Guoyang], *R. C. Ching 4463* (NY, UC). **Fujian:** *H. Chen 2190* (MO); Yenping, “Cha-ping” [Zhanping], *H. Chung 2906* (UC, W); Kushan Monastery, *S. G. Tang 5788* (UC). **Guangdong:** Canton, *B. Chen et al. 80* (MO); Youle Co., Changxi village on the way to Dadong, *N. G. Chen 42854* (MO); Canton, *China Germany Team 1024* (MO); Luofu Mtn., Huanglong-guan, *L. Deng 347* (MO); Canton, *L. Deng 7048* (MO); Canton, *L. Deng 8530* (MO); Hong Kong, *E. Faber 1885/1886* (C, S); Canton, *Z. Feng 600* (MO); Hong Kong, *C. Ford s.n.* (NY); Guangdong?, *X. P. Gao 50833* (MO); Qixian County, Qujiang, *X. P. Gao 51997* (MO); Canton, *X. P. Gao 53649* (MO); Canton, *Guangdong 77 Team-herb. 5544* (MO); Hong Kong, *Hance 240* (W); Lofaushan, *A. Henry in 1892* (NY); Canton, *H. M. Huang 111593* (MO); Lianping Xian, *Y. K. Lau 111* (AAU); Canton, *Z. Li 716* (MO); Canton, *Z. Li 2031* (MO); Xiangyi Co., *B. Z. Liang? 83655* (MO); Lofaushan, *E. D. Merrill 10230* (US); Canton, *P. X. Tan 59543* (MO); Lian Xian, *P. X. Tan 59863* (MO); Canton, *P. X. Tan 60508* (MO); “Kwangtung,” Loh Ch’ang District, Hung Pui Ts’oi, Chong Uen Shan near Kau Fung, *W. T. Tsang 20812* (MO, NY, UC, US); “Kwangtung,” Chung Tung, Tsi Tsan, Ying Tak, *W. T. Tsang & K. C. Wong 3177, herb. 15038* (UC); “Ruyuan Hsien” [Ruyuan Xian], *C. Wang 44058* (MO), *C. Wang 44094* (MO); Lofaushan, no further data, s. coll. (MO 3935534). **Hubei:** “Hupeh,” *H. C. Chow 1978* (NY);

"Hupeh," Y. X. Chong 3882 (CM). **Hunan:** Ma-Ling-Tung, C. S. Fan & Y. Y. Li 620 (W). **Jiangsu:** "Jiangsu," I-hing, W. Z. Fang 8017 (CM, MO); "Kiangsu," Chinkiang, K. Kollhoff 218 (W); **Jiangxi:** Xiu-shiu Co., "Jiangsi," S. L. Liu 890169 (MO). **Sichuan:** "Szechuan," Omei Hsien, Mt. Omei, C. L. Chow 4909 (US); Mt. Omei, Y. S. Liu 1748 (US). **Without locality & collector:** 25 Nov. 1910 (MAK 247989), Aug. 1910 (MAK 157210), 2 Oct. 1910 (MAK 247990). **JAPAN:** Kyushu. Oshumi, Higashisonoyamamura, S. Hatusima 16515 (US). **Miyazaki:** Hiyuga, Z. Tashiro in 1910 (MAK 157210); Hiyuga, Miyazaki-1.2, 26 Nov 1912, s. coll. (MAK 11690). **Kagoshima:** Satsuma, Pueblo Yoshino, B. Fukasawa in 1910 (MAK 247990).

12. *Ainsliaea fulvipes* Jeffrey & W. W. Sm., Notes Roy. Bot. Gard. Edinburgh 8: 175. 1914. TYPE: China. Yunnan: Teng-yueh 25°15', 7000 ft., May 1912, G. Forrest 7862 (lectotype, designated here, S!). Figure 25.

Plants perennial, herbaceous, 0.15–0.45 m tall; stems erect, unbranched, naked, with few leaves only, much reduced, strigose. Leaves basally clustered, rosulate, long-petiolate; petioles wingless, 2–7 cm, densely strigose; leaf blades subcoriaceous, oblong to ovate or oblong to elliptic, 3–7.5 × 1.5–4 cm, apex rounded to subobtuse, base rounded, margins shallowly denticulate and strigose; strigose on both surfaces, with straight trichomes, 1–1.8 mm; palmati-pinnate, 3-nerved. Capitula sessile or shortly pedunculate, arranged in a stachyoid inflorescence; involucre 5- or 6-seriate, cylindrical, 7–10 × 2–3 mm; phyllaries subcoriaceous, purplish and pilose above; outer phyllaries ovate, acute, 1.5–2.5 × ca. 1 mm; inner phyllaries linear to elliptic, acute, midvein dark, ca. 10 × 1 mm. Florets 3, hermaphrodite, cleistogamous; corollas pale rose, tubulose to pseudoligulate, ca. 3.5 mm, 5-lobed, lobes ca. 0.3 mm (deeper slit ca. 0.5 mm); anthers ca. 1.8 mm, apical anther appendages rounded, ca. 0.25 mm, sagittate; tails ca. 0.7 mm, slightly pilose; style branches short, truncate, ca. 0.4 mm. Achenes oblong, 3–3.5 mm, 10-nerved, densely pilose; pappus bristles 28 to 30, ca. 5.5 mm.

Distribution and phenology. *Ainsliaea fulvipes* is known only from southern and central China (Guangdong, Sichuan, Yunnan), collected from mixed forest on rocks, between 2100 and 2600 m; flowering in May and November, flower bud in September and October.

Discussion. The protologue of *Ainsliaea fulvipes* includes two specimens from the same locality, "Teng-yueh, Howell 252" and "Teng-yueh, G. Forrest 7862," the former matched as "type." Because I was unable to locate the type collection and no other original material has been found, I selected as lectotype of this taxon the specimen "G. Forrest 7862" kept at S.

Relationships. *Ainsliaea fulvipes* most resembles *A. angustata* from Sichuan province in China. Both species have as leaves basal rosettes that are long-petiolate with these petioles densely strigose. *Ainsliaea fulvipes* may be differentiated by its leaf blades oblong to elliptic (vs. linear to elliptic), with obtuse to rounded apex (vs. acute), phyllaries pilose above (vs. glabrous), and rounded anther appendages (vs. acuminate).

Representative specimens examined. CHINA. **Guandong:** Guangzhou [Canton], X. Liu 24979 (MO). **Sichuan:** Kansei, S. Q. Chen 15486 (MO). **Yunnan:** Betw. Tengyueh & the Burmese border, rd. to Sadon, near Lin Chi, J. F. Rock 7284 (US, W); Luqian Co. Xiaohou street, Y. B. Zhang 0283 (HITBC); Tengchong Co., Yunhua, 780 Team No. 833 (HITBC).

13. *Ainsliaea glabra* Hemsl., J. Linn. Soc., Bot. 23: 471. 1888. TYPE: China. Sichuan: Szechuan, Mt. Omei, 4000 ft., Dec. 1887. E. Faber 391 (lectotype, designated here, K!; duplicate, NY!). Figure 26.

Ainsliaea lancifolia Franch., Nouv. Arch. Mus. Hist. Nat., Ser. 2. 10: 41. 1888. Syn nov. TYPE: China. Xizang: Tibet Oriental, Prov. Moupin, Apr. 1869. M. l'Abbé David s.n. (holotype, P not seen; isotypes, P photo LP!, P!).

Plants perennial, herbaceous, 0.25–1.50 m tall; stems erect, unbranched, leafy, loosely strigose. Leaves basally clustered, rosulate, long-petiolate with petioles wingless, petioles 5–13(18) cm, flat; leaf blades slightly fleshy, ovate or ovate to elliptic, 6–15(20) × 2–6.5(9) cm, apex acute to acuminate, base longly cuneate into the petiole, margins obscurely denticulate; upper surface subglabrous with scarce, long straight trichomes and lower surface paler, glabrous; palmati-pinnate, 3-nerved, veins purple on the lower surface; cauline leaves alternate, sessile, ovate to lanceolate, ca. 2.5 × 1 cm. Capitula pedunculate, arranged in thyrsoid inflorescence; peduncles with glandular trichomes; involucre 5- or 6-seriate, cylindrical, 6–8 × 2–5 mm; phyllaries purple, papyraceous; outer phyllaries broadly ovate, acute, ca. 1 × 0.5 mm, glabrous or sparsely pilose; inner phyllaries linear to elliptic, subacute, midvein dark, ca. 6 × 1 mm, glabrous (rarely with short glandular trichomes). Florets 3, hermaphrodite, cleistogamous and chasmogamous (at different or same seasons); corollas white or pink; *chasmogamous* florets with corolla ligulate, ca. 8 mm, lobes ca. 4 mm (deeper slit ca. 5 mm), tube ca. 3 mm; anthers ca. 4 mm, apical appendages truncate, 0.3–0.4 mm, sagittate; tails 0.8–0.9 mm, shortly pilose; style branches truncated, ca. 0.5 mm. Achenes linear-elliptic, ca. 2.5 mm, 10-nerved; pappus bristles ca.



Figure 25. *Ainsliaea fulvipes* Jeffrey & W. W. Sm. —A. Habit. —B. Foliar trichome. —C. Capitulum. —D. Phyllaries. —E. Cleistogamous floret. —F. Stamen. —G. Style branches. Scale bars: A = 3 cm; B = 0.1 mm, C = 5 mm; D = 2 mm; E = 1.5 mm; F, G = 1 mm. Drawn from A, the paratype *Forrest* 7862 (S); B–G, *Rock* 7284 (US).

38, 5–6 mm; *cleistogamous florets* with corolla tubulose to pseudoligulate, 3.5–7 mm, 5-lobed, lobes ca. 0.2 mm (deeper slit ca. 0.5 mm), anthers ca. 2 mm; style branches ca. 0.5 mm. Achenes 3–4 mm; pappus bristles ca. 7.5 mm.

Distribution. China (Guizhou, Hubei, Hunan, Sichuan, Xizang, Yunnan) (Fig. 5B).

Discussion. Hemsley (1888: 471) mentioned in the protologue the collection “*Faber!*”. Although I was unable to find this specimen, I located at K and NY the collection “*Faber 391*,” which totally corresponds to the protologue in its detail, including agreement for the date, and consequently, I propose the specimen kept at K as the lectotype because, according to Stafleu and Cowan (1979), Hemsley’s materials can be found in this herbarium.

Ainsliaea lancifolia is proposed as new synonym of *A. glabra* because there is no diagnostic character that differentiates the former from the latter.

Relationships. *Ainsliaea glabra* is closely related to *A. nervosa*. Both species have subglabrous leaves that are long-petiolate, with wingless petioles. *Ainsliaea glabra* may be distinguished by its slightly fleshy, ovate to elliptic leaf blades (vs. narrowly elliptic and subcoriaceous).

Key to the varieties of *Ainsliaea glabra* in China

- 1a. Achenes glabrous or with few trichomes above 13a. var. *glabra*
- 1b. Achenes densely pilose 13b. var. *sutchuenensis*

13a. *Ainsliaea glabra* Hemsl. var. **glabra**. Figure 26A–L.

Florets cleistogamous or chasmogamous with corollas white or light purple. Achenes glabrous or apically pilose.

Distribution and phenology. China (Guizhou, Sichuan, Xizang, Yunnan), from the edge of woods and on grassy slopes, between 1000 and 2000 m; collected in flower in April and July, in fruit in May and September, in flower bud in October.

Representative specimens examined. CHINA. **Guizhou:** “Kweichow,” Tungtze, Y. Tsiang 5087 (NY). **Sichuan:** Pao-hsing-hsien, K. L. Chu 3939 (W); Kuan Hsien, W. P. Fang 1990 (US), W. P. Fang 1996 (US, W); Omei Hsien, W. P. Fang 3157 (W); Ku-long-tchang, E. E. Maire s.n. (W7225); Omei Hsien, Mt. Omei [Emei], W. H. Wang 8078 (US). **Yunnan:** Beyendjing, Tsin-choei-ky, P. S. Ten 354 (C, W).

13b. *Ainsliaea glabra* Hemsl. var. **sutchuenensis** (Franch.) S. E. Freire, comb. et stat. nov. Basionym: *Ainsliaea sutchuenensis* Franch., J. Bot. (Morot) 7: 296. 1894. TYPE: China.

Sichuan: “Su-tchuen oriental, Tchen-keou-tin, Ky-min-sé près de Tcheu Keou,” 1200 m, 3 May 1892, R. P. Farges 1034B (holotype, P not seen; isotypes, P photo LP!, P!). Figure 26M.

Ainsliaea tenuicaulis Mattf., Notizbl. Bot. Gart. Berlin-Dahlem 11(102): 108. 1931. *Ainsliaea glabra* var. *tenuicaulis* (Mattf.) C. C. Chang, Bull. Fan. Mem. Inst. Biol., Bot. 5: 319. 1934. Syn. nov. TYPE: China. Hubei: W. Hupeh, Apr. 1901, E. H. Wilson 1766 (lectotype, designated here, W!; duplicate, NY!).

Ainsliaea plantaginifolia Mattf., Notizbl. Bot. Gart. Berlin-Dahlem 11(102): 107. 1931. Syn. nov. TYPE: China. Hunan: Angabe, Aug. 1926, S. S. Sin 181 (lectotype, designated here, W!).

Florets chasmogamous with corollas pink. Achenes densely pilose.

Distribution and phenology. China (Hubei, Hunan, Sichuan), growing at forest margins and on grassy slopes, between 720 and 1300 m; collected in flower in April, in fruit in May.

Discussion. *Ainsliaea glabra* var. *sutchuenensis* is given varietal status because it possesses densely pilose achenes; otherwise it is typical of the species.

Ainsliaea tenuicaulis and *A. plantaginifolia* are proposed as new synonyms of *A. sutchuenensis* (= *A. glabra* var. *sutchuenensis*) because there is no diagnostic character to separate them as distinct taxa.

Because the collection mentioned in the protologue of *Ainsliaea tenuicaulis*, “E.H. Wilson n. 1766, Hb. Berol.,” was probably destroyed, the collection deposited at W is selected as lectotype because it presents the most complete plant. The holotype specimen of *A. plantaginifolia* at B was also probably destroyed, and, therefore, the isotype at W, which is sufficiently diagnostic, is designated as lectotype.

Representative specimens examined. CHINA. **Sichuan:** “Su-tchuen oriental, Tcheu-kéou-tin” [Chengkou], s.d., R. P. Farges s.n. (US); Nanchuan Co., Z. Y. Liu 15451 (CANB); Omei Hsien, Mount Omei, C. L. Sun 1462 (US). **Hubei:** Changyang (Chang-Jiang), A. Henry 7599 (paratype of *A. tenuicaulis*, MO).

14. *Ainsliaea glumacea* (Fr.) Sch. Bip., Jahresber. Pollichia 20-21: 407. 1863. Basionym: *Hieracium glumaceum* Fr., Epicr. Hierac.: 141, 1861(1862). TYPE: India, Silhet, year 1830, Wallich s.n. (lectotype, designated here, K-WALL 3280 not seen; duplicate, K photo LP!). Figure 27.

Ainsliaea angustifolia Hook. f. & Thoms. ex C. B. Clarke, J. Linn. Soc. 14: 412. 1875. Syn. nov. TYPE: India. Khasia, 4000–6000 ped., s.d., J. D. Hooker & T. Thomson s.n. (holotype, K!; isotypes, C!, M!, NY!, S!, UC!, US!, W!).

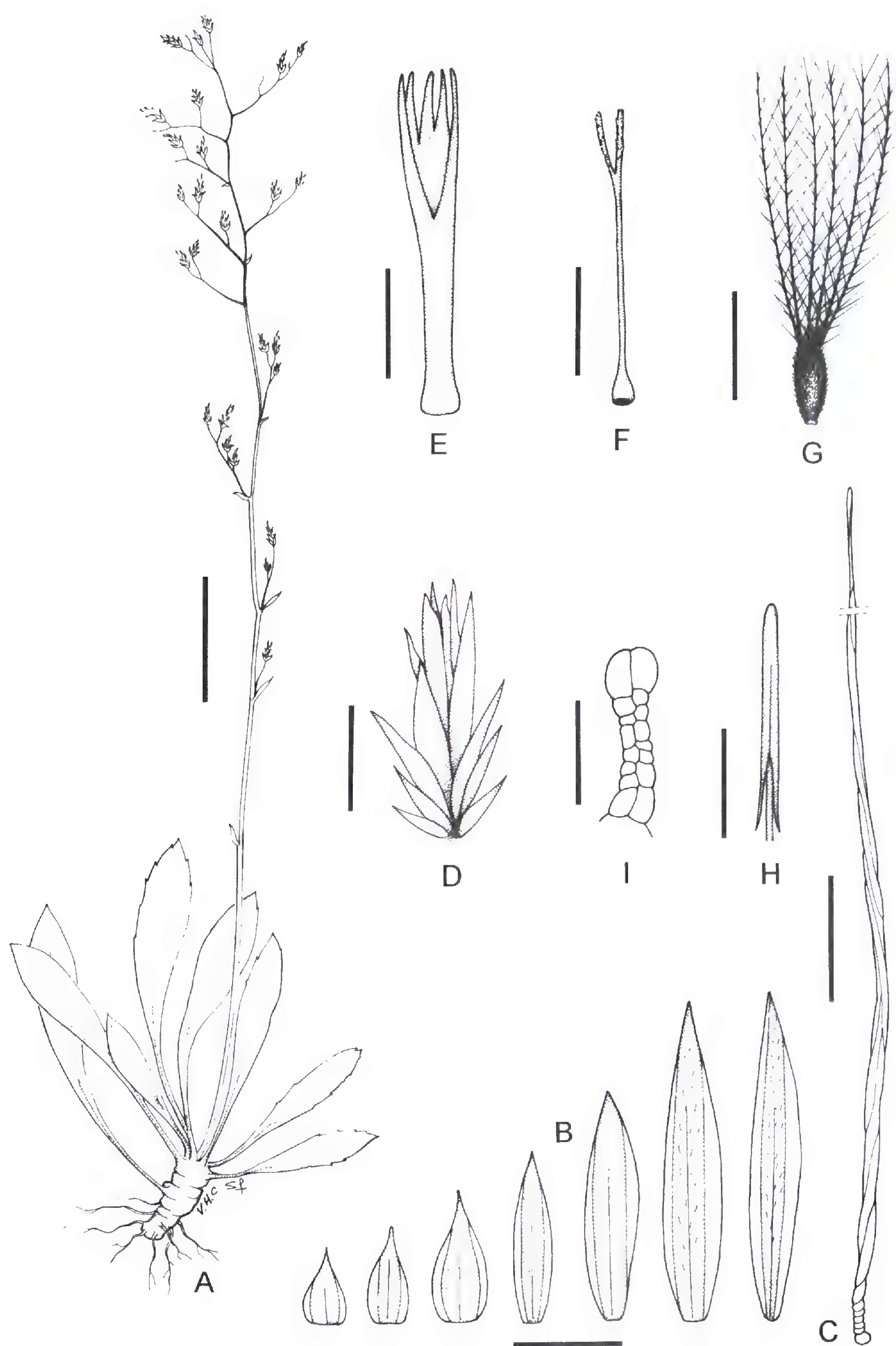


Figure 27. *Ainsliaea glumacea* (Fr.) Sch. Bip. —A. Habit. —B. Phyllaries. —C. Foliar trichome. —D. Capitulum. —E–H. Cleistogamous floret: E, corolla; F, style; G, achene with pappus; H, stamen. —I. Glandular trichome of inner phyllary. Scale bars: A = 3 cm; B, D, G = 2 mm; C = 0.3 mm; E, F = 1 mm; H = 0.5 mm; I = 0.05 mm. Drawn from *Hooker f. & Thomson s.n.* (US).

Plants perennial, herbaceous, (0.14)0.25–0.35 m tall; stems erect, unbranched below the inflorescence, with few leaves much reduced, moderately strigose. Leaves basally clustered, rosulate, sessile; leaf blades slightly fleshy, linear to obovate, 6–10 × 1–1.5 cm, apex acute to obtuse, longly attenuate at the base; margins obscurely denticulate above; upper surface sparsely strigose to glabrous and lower surface sparsely strigose, with long straight trichomes, 2–2.5 mm; palmati-pinnate, 3-nerved. Capitula pedunculate, arranged in thyrsoïd inflorescence; involucre 5- to 7-seriate, cylindrical, 5–9 × 1.5–3(5) mm; phyllaries papyraceous; outer phyllaries ovate to lanceolate, acuminate, 1.5–2.8 × 0.8–1.5 mm, glabrous; inner phyllaries narrowly lanceolate, acute, midvein dark, 6.5–7.5 × 1–1.2 mm, shortly pubescent (glandular and non-glandular trichomes). Florets 3 or 4, hermaphrodite, cleistogamous; corollas white or pink, tubulose to pseudoligulate, 2.8–3.7 mm, lobes 0.25–0.75 mm (deeper slit 1–1.5 mm), tube 1.8–2.2 mm; anthers ca. 1.5–1.7 mm, apical appendages rounded, 0.4–0.5 mm, sagittate; tails 0.5–0.7 mm, smooth to slightly pilose; style branches short, rounded, 0.6–1 mm. Achenes oblong, 1.5–3 mm, 9-nerved, densely pilose; pappus bristles 25 to 30, ca. 5 mm.

Distribution and phenology. Bangladesh, India, and Pakistan, collected from moist, shady places along river and stream margins amid rocky boulders, between 600 and 1500 m (Fig. 5A); flowering in February and March and from October to December.

Discussion. The name *Ainsliaea angustifolia*, which appeared as a correct name in the Index Kewensis, was described in 1875 by C. B. Clarke from the Hooker f. & Thomson collection from Khasya (India). One year later, Clarke used this name in his survey of *Compositae Indicae* (1876: 247). However, 13 years earlier in 1862, E. M. Fries had published *Hieracium glumaceum* from Silhet (India) in *Episc. Hierac.* (= Upsala Univ. Arsskr.), which was transferred to the genus *Ainsliaea* by Schultz Bipontinus in 1863. Both description and transference were overlooked by Clarke, perhaps because of the unexpected places of publication. The name *A. angustifolia* was also used by J. D. Hooker in his *Flora of British India*. Although he referred in his treatment to the name *A. glumacea*, his reference is to the species described by Klatt in 1878 (Sitzungsb. Munch. Kad.: 97), not to *A. glumacea* (D. Don) Sch. Bip., which was obviously placed in synonymy. The name *Hieracium glumaceum* Fr. was published by E. M. Fries based on a Wallich specimen, without mentioning details of the collection, although there is some suspicion that the specimen was *Wallich Cat. 3280*. In fact, Fries mentioned in his description that the specimen on

which he based *H. glumaceum* was widely distributed under the unpublished manuscript name of *Prenanthes candolleana* Wall. (= *Wall. Cat. 3280*), in his words “cum priori s.n. Prenanth. Candollei promiscue distribuit Wallich . . .” Furthermore, when Schultz Bipontinus (1863: 407–408) transferred *H. glumaceum* to the genus *Ainsliaea*, he mentioned this specimen (“Wallich 3280 ex parte”).

Wallich 3280 seems to be a problematic specimen, i.e., as pointed out by Clarke (1875: 411), “an original sheet in the Calcutta-herbarium of Wallich, numbered 3280, with a reference to the comp. N.390, which number refers to the name *Prenanthes candolleana* Wall., corresponds to the description of *Hieracium silhetense* DC.” (it was seen by references on the same sheet by de Candolle and Fries!). Furthermore, Clarke (1875: 413) also says that another “authentic specimen of *Hieracium silhetense* (Wallich 3280 with the number probably written on it in Wallich’s own hand) is *Ainsliaea angustifolia* Hook. f. et Thoms.” In other words, under one Wallichian number and name, two species, *H. silhetense* DC. and *A. angustifolia* Hook. f. & Thoms. ex C. B. Clarke, were mixed. A few years later, one further species is linked to *Wallich 3280*, i.e., Hooker (1881: 388) mentioned “*Prenanthes? Candolleana*, Wall. Cat. 3280, in part” as a synonym of *A. pteropoda* DC.

Dr. D. J. N. Hind at K sent me a photo with two specimens mounted on it. The first was collected in Silhet, of which the label reads “*Prenanthes Candolleana* Wall. Monte Silhet Wallich 1830, 3280/390,” and the second was collected in Khasya, of which the label reads “Khasya/Griffith/Leman 1845.” The specimen collected in Silhet in 1830, which totally agrees with the protologue, is here designated as the lectotype of *Hieracium glumaceum*.

After examining the type material, I consider that there are no diagnostic characters with which to separate *Ainsliaea angustifolia* and *A. glumacea*.

Relationships. *Ainsliaea glumacea* shared a similar habit with *A. latifolia* (D. Don) Sch. Bip. (including var. *taiwanensis*), as a scapose perennial with a basal rosette. *Ainsliaea glumacea* is clearly distinguished by its leaf blades that are linear to obovate (vs. ovate to elliptic), attenuate and narrow at the base (vs. abruptly contracted), and strigose beneath (vs. tomentose), as well as by its smaller capitula (5–9 mm) and achenes (1.5–3 mm) (vs. 8–10 mm and 3.5–5.5 mm, respectively, in *A. latifolia*). This species also resembles *A. reflexa* in its leaves, but *A. glumacea* is distinct from *A. reflexa* by its leaf blades attenuate and sessile (vs. leaves long-petiolate with the blades abruptly contracted and cuneate) as well as by the thyrsoïd inflorescence (vs. stachyoid in *A. reflexa*).

Representative specimens examined. BANGLADESH. "East Bengal," Griffith 3329/1 (C, M, S); "Afghanistan," Griffith 3329/1 (NY). INDIA. **Assam:** Khasia, J. D. Hooker s.n. (NY); Jowai, Jaintia Hills, Dr. Kings in 1897 (CAL); Cherrapungi, G. Panigrahi 4798 (CAL); Eastern Circle, Shillong, Subansiri F.D. (N.E.F.A.), Hapoli, G. Panigrahi 19832 (CAL); Meghalaya, Jing King Swan, Lang Laosi, Nongstoin, P. C. Parot 51434 (MO); Eastern Circle, Shillong, Subansiri F.D. (N.E.F.A.), Hapoli, A. R. K. Sastry 41016 (CAL); "Environs of Tserapúndzi till near Máirong," ex herb. Schlagintweit, Cat. No. 391 (US). PAKISTAN. Prov. Punjab, environs of "Raulpindi" [Rawalpindi], ex herb. Schlagintweit, Cat. No. 10864 (UC); Prov. Punjab, Kalabagh, ex herb. Schlagintweit, Cat. No. 11960 (S).

15. *Ainsliaea henryi* Diels, Bot. Jahrb. Syst. 29: 628. 1901. *Ainsliaea latifolia* subsp. *henryi* (Diels) H. Koyama, Acta Phytotax. Geobot. 32 (1–4): 60. 1981. TYPE: China. Hubei: Hupeh, Mar. 1889, A. Henry 6639 (type, K!). Figure 28.

Ainsliaea undulata Diels, Bot. Jahrb. Syst. 29: 629. 1901. TYPE: China. Sichuan: S Nan'chuan: Huo pan chu p'ing, C. Bock et A. v. Rosthorn 773 (type, O!).

Plants perennial, herbaceous, 0.10–0.55 m tall; stems erect, unbranched, naked, loosely strigose. Leaves basally clustered, rosulate; leaf blades membranous, apex acute, margins slightly wavy, obscurely denticulate-mucronate; upper surface subglabrous, and lower surface sparsely strigose with long straight trichomes, ca. 1.5–2 mm; palmati-pinnate, 3-nerved. Capitula sessile or short-pedunculate, arranged in a stachyoid inflorescence; involucre 5- or 6-seriate, cylindrical, ca. 7.5 × 2.5 mm; phyllaries papyraceous, apically purple and strigose; outer phyllaries narrowly ovate, acuminate, ca. 2.5 × 1 mm; inner phyllaries linear, acute, midvein dark, ca. 7.5 × 0.6 mm. Florets 1 to 3, hermaphrodite, cleistogamous and chasmogamous without pappus (usually at different seasons); corollas white; *chasmogamous florets* with corollas ligulate, ca. 7.5 mm, lobes 2.5–4 mm (deeper slit ca. 5 mm), tube ca. 2.5 mm; anthers ca. 3.5 mm long, apical appendages rounded, ca. 0.8 mm, sagittate; tails ca. 0.8 mm, pilose; style branches short, truncate, ca. 0.3 mm. Achenes oblong-elliptic, ca. 1.5 mm, glabrous or shortly pilose above, 10-nerved, pappus absent; *cleistogamous florets* with corollas tubulose to pseudoligulate, ca. 3.5 mm, 5-lobed, lobes ca. 0.2 mm (deeper slit ca. 0.3 mm), tube 3.2 mm; anthers ca. 0.7 mm; style branches ca. 0.4 mm. Achenes narrowly oblong, 2.5–5 mm, 10-nerved, glabrous or shortly pilose above; pappus bristles 29 to 35, ca. 6 mm.

Distribution. China (Fujian, Guangxi, Guizhou, Hubei, Hunan, Sichuan, Yunnan) and Taiwan (Fig. 5A).

Discussion. Although Koyama (1981) regarded *Ainsliaea henryi* as a subspecies of *A. latifolia*, I consider that it should be retained as a distinct species. The leaves of typical *A. latifolia* are ovate with winged petioles, the achenes are pubescent, and the inflorescences consist of generally three or four capitula per node. The leaves of *A. henryi* are obovate subsessile to only short-petiolate, the achenes are glabrous or apically pubescent, with the inflorescence as a solitary capitulum or two or three capitula.

Relationships. *Ainsliaea henryi* resembles *A. reflexa* in leaf shape, ovate to obovate and ovate to elliptic, respectively, but it is distinguished by its achenes glabrous or apically pilose (vs. pilose in *A. reflexa*).

Ainsliaea henryi is recognized in this treatment with two varieties, their distribution overlapping only in Taiwan.

Key to the varieties of Ainsliaea henryi in China and Taiwan

- 1a. Leaves obovate, attenuate into the petiole, petiole winged on the upper half 15a. var. *henryi*
- 1b. Leaves ovate, rounded or cuneate at the base, petiole wingless 15b. var. *subalpina*

15a. *Ainsliaea henryi* Diels var. **henryi**. Figure 28A–L.

Leaves obovate to oblong, 4.5–8.5 × 1.8–3 cm, subobtuse at the apex and attenuate at the base; petiole winged in upper half.

Distribution and phenology. China (Fujian, Guangxi, Guizhou, Hunan, Hubei, Sichuan) and Taiwan, collected in rock crevices and forests, at elevations between 1570 and 1800 m; flowering from July to October and in December, January, and March.

Representative specimens examined. CHINA. **Fujian:** S. Wuyi Team 80-0203 (MO). **Guangxi:** Northern "Kwangsi" [Shangsi], Kwei-lin District, Hsi-chang village & vicinity Ch'i-fen-shan, Kwei-lin, W. T. Tsang 28500 (US). **Guizhou:** "S Wushan" [Wuchuan], E. H. Wilson 2159 (W). **Hubei:** "Hupeh," A. Henry 7161 (NY); "W Hupeh," E. H. Wilson 2159 (NY). **Hunan:** Hunan, Xinning, Ziyunshan, Z. Y. Li et al. 326 (CANB); Hunan, P. X. Tan 62920 (MO). TAIWAN. **Nan-tou:** Ten-tzu to nen-kao, Co. Nantou, T. C. Huang et al. 5798 (MO).

15b. *Ainsliaea henryi* var. **subalpina** (Hand.-Mazz.) S. E. Freire, comb. nov. Basionym: *Ainsliaea reflexa* Merr. var. *subalpina* Hand.-Mazz., Akad. Wiss. Wien, Math.-Naturwiss. Kl., Denkschr. 63(1): 12. 1926. TYPE: China. "Inter urbem Yungbei et pagum Yungning, in montis Hungguwo prope Hsinyingpan, in fruticetis

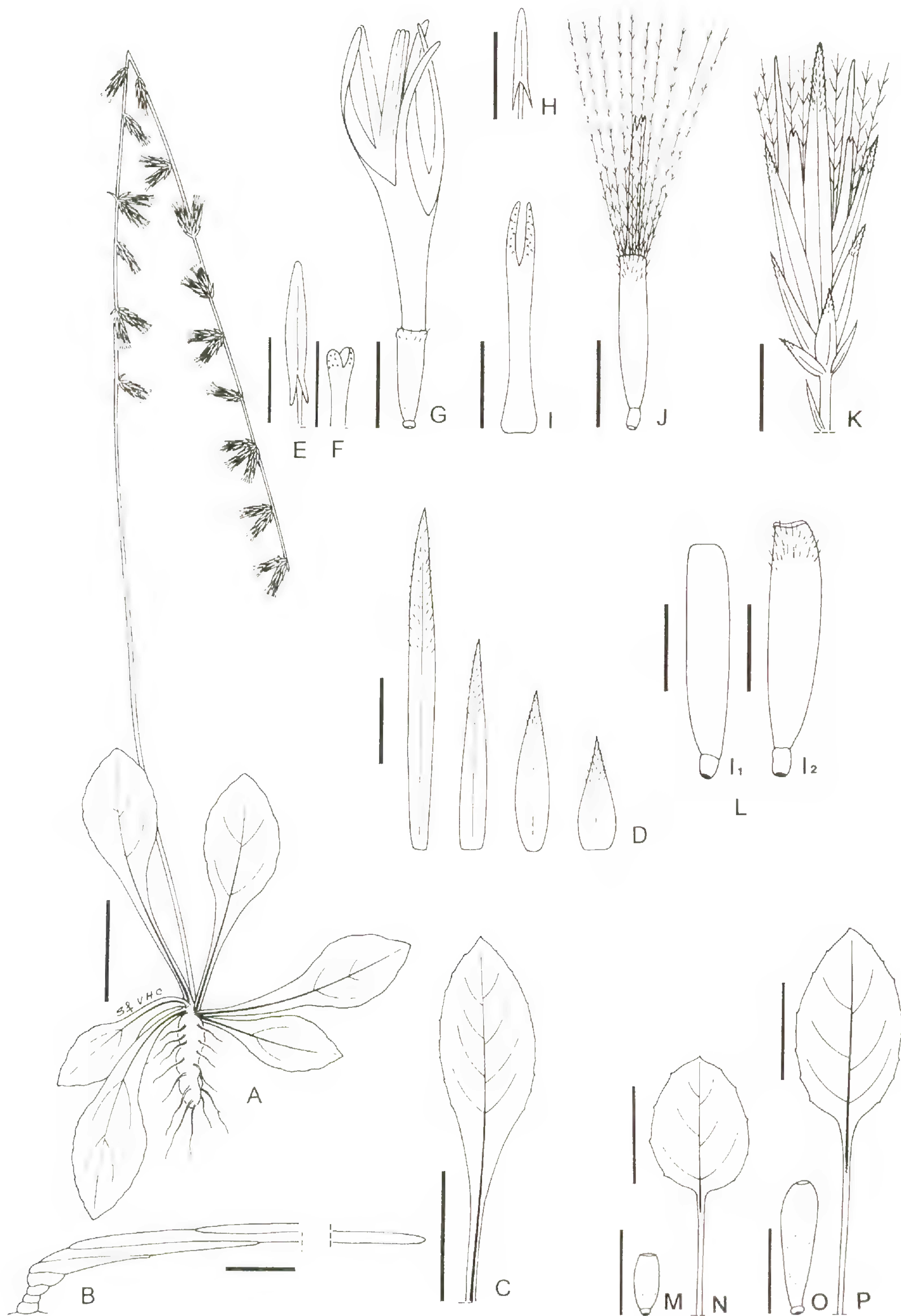


Figure 28. *Ainsliaea henryi* Diels. A–L. *A. henryi* var. *henryi*. —A. Habit. —B. Foliar trichome. —C. Leaf. —D. Phyllaries. —E. Stamen of chasmogamous floret. —F. Style branches of chasmogamous floret. —G. Chasmogamous floret. —H. Stamen of cleistogamous floret. —I. Style of cleistogamous floret. —J. Cleistogamous floret. —K. Capitulum. —L. Achenes of cleistogamous florets. M–P. *A. henryi* var. *subalpina* (Hand.-Mazz.) S. E. Freire. —M. Achene of chasmogamous floret. —O. Achene of cleistogamous floret. —N, P. Leaves. Scale bars: A = 3 cm; B = 0.1 mm; C = 2 cm; D = 2 mm; E, G = 2 mm;

bambusetisque,” 3100–3450 m, 28 June 1914, *F. Handel-Mazzetti* 3282, Diar. No. 670 (holotype, W!). Figure 28M–P.

Ainsliaea morrisonicola Hayata, J. Coll. Agric. Imp. Univ. Tokyo 25(19): 142. 1908. Replaced name: *Ainsliaea elegans* Hayata, Bot. Mag. (Tokyo) 20(229): 14. 1906. non *Ainsliaea elegans* Hemsley, Hooker’s Icon. Pl. 28(2): t. 2747. 1902. *Ainsliaea reflexa* f. *morrisonicola* (Hayata) Suzuki, Annual Rep. Taihoku Bot. Gard. 1: 180. 1931. *Ainsliaea reflexa* var. *morrisonicola* (Hayata) Yamam., J. Soc. Trop. Agric. 8: 264. 1936. Syn. nov. TYPE: China. Taiwan. Mt. Morrison. Seizan ad 11707 ped, 3 Nov. 1905, S. Nagasawa, T. Kawakami et G. Nakahara s.n. (type, PH 51684!).

Ainsliaea reflexa Merr. var. *nimborum* Hand.-Mazz., Akad. Wiss. Wien, Math.-Naturwiss. Kl., Denkschr. 63(1): 12. 1926. *Ainsliaea latifolia* var. *nimborum* (Hand.-Mazz.) Kitam., Acta Phytotax. Geobot. 19(1): 14. 1961. Syn. nov. TYPE: China. Yunnan: In pluviisilvis mixtis temperatis vallis Doyonlumba ad fluvium Lu-djiang (Salween), ca. 28°2′, 3250–3450 m, 23 Sep. 1915, *F. Handel-Mazzetti* 8343, Diar. Nr. 1538 (holotype, W!; isotype, WU!).

Ainsliaea henryi var. *ovatifolia* C. C. Chang, Sinensia 4(8): 227. 1934. Syn. nov. TYPE: China. Yunnan: without locality, *G. Forrest* 5681 (holotype, K!; isotype, K photo LP!).

Leaf blades ovate, 2.5–3.8 × 1.5–2.4 cm, rounded or cuneate at the base, with long slender wingless petioles, 3.5–5.5 cm.

Distribution and phenology. China (Yunnan) and Taiwan, from *Abies* Mill. forest, from sunny grassland, and from *Tsuga* (Endl.) Carrière community, from elevations between 2000 and 3900 m; collected in flower in June, August, September, and November.

Discussion. I propose to transfer *Ainsliaea reflexa* var. *subalpina* Hand.-Mazz. from *A. reflexa* to *A. henryi* because it possesses glabrous achenes (vs. pilose in *A. reflexa*); consequently, the new combination *A. henryi* var. *subalpina* (Hand.-Mazz.) S. E. Freire is made.

Ainsliaea reflexa var. *nimborum* was said to differ from *A. reflexa* var. *subalpina* (= *A. henryi* var. *subalpina*) by its achenes without pappus (vs. achenes with pappus in the var. *subalpina*). However, it is a variable feature throughout the range of *A. henryi* var. *subalpina*.

After examining the type material, I consider that there are no diagnostic characters with which to separate *Ainsliaea morrisonicola* and *A. henryi* var. *ovatifolia* from *A. henryi* var. *subalpina*. All have glabrous achenes and ovate leaves that are round or

slightly cuneate at the base, with long slender wingless petioles.

Observation. *Ainsliaea hayatae* Beauverd (Bull. Soc. Genève. Sér. 2, 2: 382. 1910) and *A. hayatae* H. Lév. (Cat. Pl. Yunnan 36. 1915), which were proposed to replace *A. elegans* Hayata, represent later homonyms.

Vernacular name. Okada-haguma (Yamamoto, 1936).

Type observation. The sheet at PH (51684) is interpreted as the type of *Ainsliaea elegans* Hayata, based on “Nakahara, 3 Nov. 1905” on the label, but its locality is otherwise illegible.

Representative specimens examined. CHINA. **Yunnan:** “Inter pagum Dschungdien [Chungtien] et vieum Djitsung,” *F. Handel-Mazzetti* 7808, Diar. Nr. 1429 (paratype of *Ainsliaea henryi* var. *subalpina* W, WU); Tsekou, *P. T. Manberg* 681 (paratype of *A. henryi* var. *ovatifolia*, K). TAIWAN. **Hsinchu:** The uppermost district of Takochin-chi, northern slope of Mt. Pintien, *T. Shimizu* 20394 (S). **Ilan:** Mt. Nan-liu, Co. Ilan, C. C. Chuang et M. T. Kao 2526, p.p. (AAU); rd. from Nan-shan (Piyanan) to Mt. Chung-yang-chien, betw. Matakotou River & Pa, *M. Tamura et H. Koyama* 23595 (S); Ilan Hsien, Taroko National Park, valley at ca. 3.5 km from Yunling Camp (ca. 12.5 km below Nanhutashan by trail), *W. L. Wagner* 6515 (MO, US). **Nantou:** Mt. Neng-kao, betw. Yun-hai (Onoe) and Tien-chih (Noko), *M. Tamura et H. Koyama* 23261 (S). **Nokosan:** Nokosan, Mt. Noko, betw. Noko Police Station & the Prefecture boundary, W of the divide, *H. H. Bartlett* 6215 (NY, UC, US). **Taichung:** Mt. Hsueh-shan, between Shikayoutashan and the main peak, *M. Tamura* 21079 (C). **Unknown:** Arisan, *R. Kanehira* 2945 (NY); Mt. Morrison, *Kanehira* 3051 (NY); Hassen-zan, *R. Kanehira* 21194 (UC); Mt. Arisan, *Masumura in* 1931 (MO); Mt. Taiheizan, *S. Suzuki in* 1928 (MO); Mt. Taiheizan, *S. Suzuki in* 1929 (UC); Mt. Chiagshi, Co. Hualien, *M. Teraya* 459, p.p. (CM); Mt. Morrison, 23 Aug. 1949, s. coll. (DAO).

16. *Ainsliaea hypoleuca* Diels ex H. Limpr., in Limpr., Feddes Repert. Beih. 12: 514. 1922. TYPE: China. Sichuan: Szetchuan, Kwan Hsien, 800–1000 m, 9 Apr. 1914, *H. Limpricht* 1251 (lectotype, designated here, W!; duplicate, S!). Figure 29.

Ainsliaea petelotii Merr., J. Arnold Arbor. 21: 388. 1940. Syn. nov. TYPE: Vietnam. Tonkin: Cha Pa, massif du Song to Van, 1800 m, Apr. 1936, *A. Pételot* 2082 (holotype, GH not seen; isotypes, MO!, NY!).

Plants perennial, herbaceous, 0.25–0.60 m tall; stems erect, unbranched, and leafy, lanuginose.

←

F = 1 mm; H, I = 0.5 mm; J, K = 2 mm; L = 1.5 mm; M, O = 2 mm; N, P = 1.5 mm. Drawn from A, D–L, *l*₂, *Tsang* 28500 (US); B, *Henry* 7461 (NY); C, *Wilson* 2159 (W); L, *l*₁, *Li et al.* 326 (CANB); M, N, the paratype *Handel-Mazzetti* 7808 (W); O, P, the type *Handel-Mazzetti* 8343 (W).

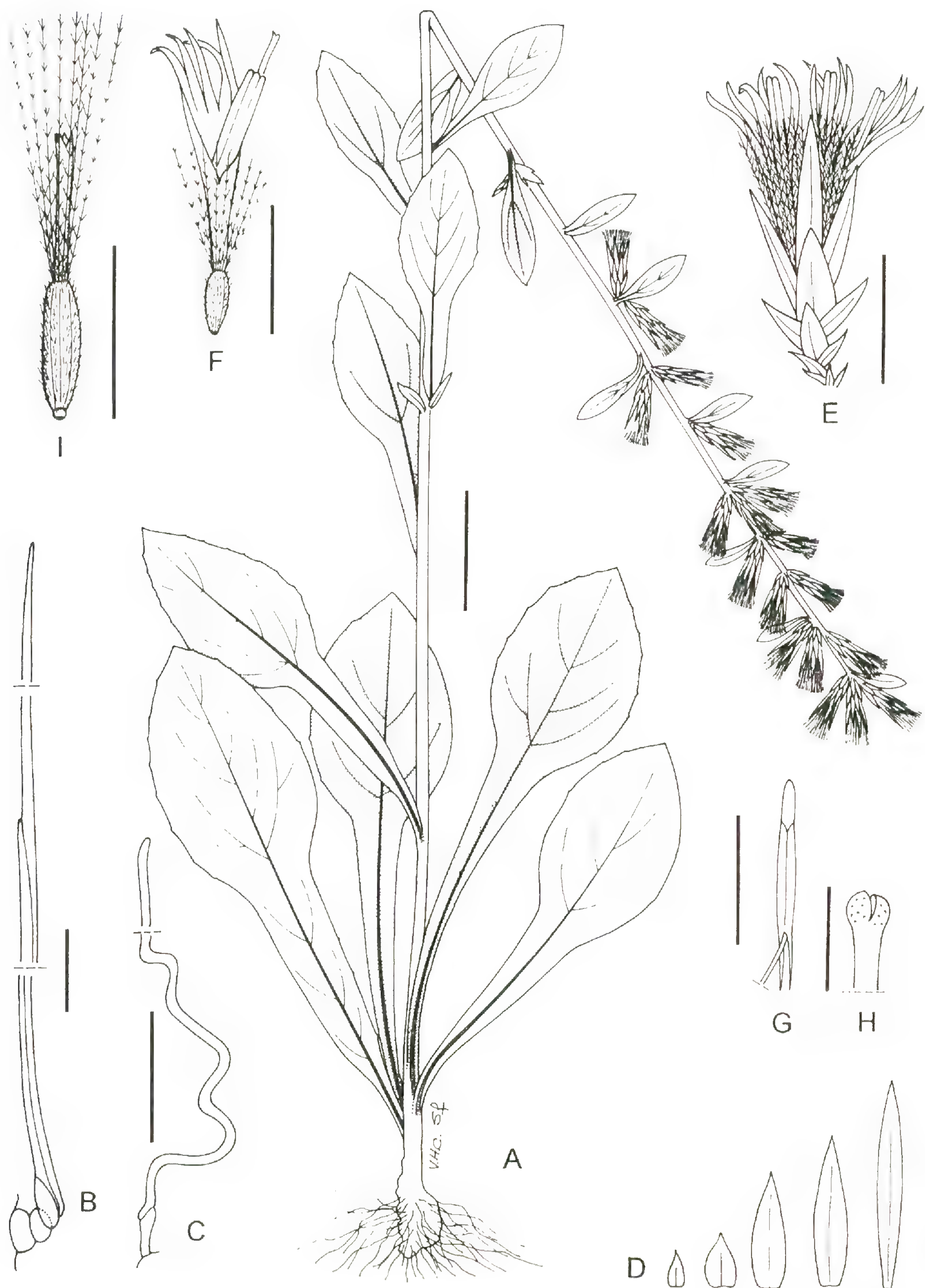


Figure 29. *Ainsliaea hypoleuca* Diels ex H. Lampr. —A. Habit. —B, C. Foliar trichomes. —D. Phyllaries. —E. Capitulum. —F. Chasmogamous floret. —G. Stamen of chasmogamous floret. —H. Style branches of chasmogamous floret. —I. Cleistogamous floret. Scale bars: A = 3 cm; B, C = 0.05 mm; D–G, I = 5 mm; H = 1 mm. Drawn from A, D–I, *Esquirol in 1917* (UC); B, C, *Bodinier & Ducloux in 1897* (US).

Leaves basally clustered, rosulate, long-petiolate; petioles broadly winged narrowing to the base, 2–7.5 × 0.7–1.4 cm (at the upper point); leaf blades chartaceous, ovate, 4–7.5 × 1.8–4 cm, apex acute

to subobtuse, base rounded, margins obscurely denticulate; strongly discolorous, with upper surface deep green, sparsely strigose, and lower surface white strigose-lanate, with long crisped trichomes and long

straight trichomes, 2–3 mm; palmati-pinnate, 3-nerved; cauline leaves alternate, similar to the basal, gradually reduced upward to the base of the inflorescence. Capitula sessile or shortly pedunculate, arranged in a stachyoid inflorescence; involucre 6- or 7-seriate, cylindrical, 9–10 × 1.5–4 mm; phyllaries papyraceous, glabrescent to sparsely strigose above; outer phyllaries ovate, acute, ca. 1.5 × 0.8 mm; inner phyllaries linear to elliptic, acute to acuminate, midvein dark, ca. 8.5 × 1 mm. Florets 3, hermaphrodite, chasmogamous and cleistogamous (in single plant and in different seasons); corollas white (rarely pink); *chasmogamous florets* with corolla ligulate, ca. 9 mm, lobes ca. 4 mm (deeper slit ca. 5 mm), tube ca. 4 mm; anthers purple, ca. 7.5 mm, apical appendages truncate, ca. 1.5 mm, sagittate; tails ca. 1.8 mm, shortly pilose; style branches short, rounded, ca. 0.25 mm. Achenes oblong, ca. 2 mm, densely pilose, 10-nerved; pappus bristles 30 to 32, ca. 5 mm; *cleistogamous florets* with corolla tubulose to pseudoligulate, ca. 4 mm, 4- or 5-lobed, lobes 0.5 mm (deeper slit ca. 0.8 mm); anthers ca. 1.3 mm; style branches ca. 0.50 mm. Achenes 3.5–4 mm; pappus bristles ca. 7.5 mm.

Distribution and phenology. Valley with evergreen forest and in very dry open places in full sunlight or some shade, from southern and central China (Hubei, Sichuan, Yunnan) and northern Vietnam. Between 800 and 2700 m (Fig. 5A); collected in flower in January, February, April, and June.

Discussion. I propose to place *Ainsliaea petelotii* (which is characterized in the protologue by its leaves densely pubescent beneath and entirely glabrous above) into synonymy of *A. hypoleuca* because there is no diagnostic character that differentiates the former from the latter.

Because no herbarium was mentioned for the type specimen in the protologue of *Ainsliaea hypoleuca*, I propose the collection kept at W as lectotype because it presents the most complete plant.

Relationships. *Ainsliaea hypoleuca* resembles *A. latifolia* var. *latifolia*, sharing ovate leaves basally clustered, with the petioles broadly winged. *Ainsliaea hypoleuca* is distinguished by its strongly discolorous leaves, which are densely white-tomentose below but deep green and glabrous above.

Representative specimens examined. CHINA. **Hubei:** Shennongjia Forest District, vicinity of Houshanping on the S side of the Hou River, B. Bartholomew et al. (*Sino-Amer. Exped.*) 1598 (CM, MO, UC). **Sichuan:** Tien-chuan-hsien, K. L. Chu 2564 (W); “Kuang Hsien,” J. Esquirol in 1917 (UC); “Setschwan,” in montium trans flumen Yalung ad septentr. oppidi Yenyüen, F. Handel-Mazzetti 2615, Diar. Nr. 491 (W); in montis Houdsengai prope oppidum Tetschang in valle Kientschang, F. Handel-Mazzetti 1835, Diar. Nr. 302 (W); “W-Setschwan, Wa-schan südl. v. Yatschou,” H. Weigold in

1915 (W); Muli Co., at the bank of Kata Jiang River, 24 Aug. 1983, s. coll. 44 (HITBC). **Yunnan:** Environs Yunnan. M. M. Bodinier & F. Ducloux in 1897 (US); Yunnan, K. Hou 74248 (MO); NE Yunnan, Ma-li-ouan, E. E. Maire s.n. (W 7229, 7231); Siao-ho, E. E. Maire 3155B (UC); Yunnan. E. E. Maire 3155 (NY); Yunnan-sen, Kunming, near Gingham temple, G. Murata 10486 (US); Malipo, Q. W. Wang 83962 (HITBC). **VIETNAM.** Tonkin, A. Pételot 1452 (NY); Tonkin, Cha Pa, A. Pételot 4552 (paratype of *A. petelotii*, NY, US).

17. *Ainsliaea latifolia* (D. Don) Sch. Bip., Jahresber. Pollichia 18: 190. 1861. Basionym: *Liatris latifolia* D. Don, Prodr. Fl. Nepal: 169. 1825. TYPE: Nepal. Narainhetty “Perdicium ? triflorum,” 24 Feb. 1803, Hamilton s.n. (holotype, BM not seen; isotype, K not seen, K photo LP!). Figure 30.

Ainsliaea pteropoda DC., Prodr. 7: 14. 1838. TYPE: India. “Ind. or.,” Royle s.n. (lectotype, designated here, K!). Thailand. Chiang Mai: Western flank of Doi Inthanond, Mae Pau, 7 Dec. 1969, C. F. v. Beusekom & C. Phengkklai 2370 (epitype, designated here, BKF!; duplicates, AAU!, C!, CANB!).

Ainsliaea pteropoda DC. var. *silhetensis* DC., Prodr. 7: 14. 1838. *Ainsliaea silhetensis* (DC.) C. B. Clarke, J. Linn. Soc. 14: 411. 1875. TYPE: India. Silhet, Wallich 2927, c.37 (lectotype, designated here, P not seen; duplicate, P photo LP!).

Ainsliaea heterantha Hand.-Mazz., Oesterr. Bot. Z. 87(1): 128. 1938. Syn. nov. TYPE: China. Yunnan: Yuenkiang and Schaping (Schiping), Djutschin-Yako, 11 May 1935, H. v. Wissmann 777 (holotype, W!).

Plants perennial, herbaceous, 0.25–0.70(1.20) m tall; stems erect, simple or few branched, with few leaves much reduced, loosely strigose. Leaves basally clustered, rosulate, long-petiolate; petioles broadly winged; leaf blades chartaceous, ovate, acute to subobtuse at the apex, base rounded, margins obscurely denticulate; palmati-pinnate, 3-nerved; cauline leaves alternate, short-petiolate to sessile, ovate to ovate-lanceolate. Capitula sessile or short-pedunculate, arranged in a stachyoid inflorescence; involucre 5- to 7-seriate, cylindrical, 8–10 × ca. 4 mm; phyllaries papyraceous; outer phyllaries ovate, acute, 2–3 × ca. 1 mm, apically strigose; inner phyllaries linear-oblong, acute, usually midvein dark, 7–12 × ca. 1 mm, glabrous or apically strigose. Florets 3, hermaphrodite, chasmogamous and cleistogamous (at different seasons or in single plant); corollas white, pink, or purplish; *chasmogamous florets* with corollas ligulate, 8–10 mm, lobes 2.5–4 mm (deeper slit 5–5.5 mm), tube 2.5–5 mm; anthers purplish, 4–5 mm, apical appendages rounded, ca. 0.6 mm, sagittate; tails 1–2 mm, shortly pilose; style branches short, truncate, ca. 0.5–0.7 mm. Achenes oblong, 1.8–2.5 mm, densely pilose, 10-nerved;



Figure 30. *Ainsliaea latifolia* (D. Don) Sch. Bip. A–J. *A. latifolia* var. *latifolia*. —A. Habit. —B–D. Foliar trichomes. —E. Phyllaries. —F. Cleistogamous floret. —G, H. Chasmogamous florets. —I. Style branches of chasmogamous floret. —J. Stamen of chasmogamous floret. —K. *A. latifolia* var. *taiwanensis* S. E. Freire. Scale bars: A, K = 3 cm; B, D = 0.05 mm; C = 0.1 mm; E = 3.5 mm; F–H = 2 mm; I, J = 1 mm. Drawn from A, E, G, I, J, *Drummond 25596* (UC); B–D, *Koyama et al. T-30524* (C); F, H, *Wissmann 777* (W); K, *Tamura & Koyama 23729* (S).

pappus bristles (sometimes absent) 29 to 34, 5–8 mm; *cleistogamous florets* with corollas tubulose to pseudoligulate, 2–5.5 mm, 5-lobed, lobes 0.25–0.75 mm (deeper slit 1–1.5 mm); anthers ca. 2 mm; style branches ca. 0.5 mm. Achenes 3.5–5.5 mm, densely pilose; pappus bristles 7–10 mm.

Distribution. Bangladesh, Bhutan, China (Guangdong, Yunnan), India, Indonesia (Sumatra), Myanmar, Nepal, Taiwan, and Thailand, at elevations between 1100 and 3600 m (Fig. 5B).

Discussion. The protologue of *Ainsliaea pteropoda* includes the specimen *Wallich 2927, c.37* from Nepal and the collection *Royle s.n.* from “Ind. or.” The first was located at W, and the second at K. I propose the material “Ind. or., *Royle s.n.*” kept at K, which presents the most complete plant, as lectotype of *A. pteropoda*. However, because the leaves of the specimen *Royle s.n.* are not well preserved, I also propose the collection *C. F. v. Beusekon & C. Phengklai 2370* kept at BKF, which is a widely distributed collection (duplicates seen at AAU, C, CANB) and agrees with the protologue of *A. pteropoda*, as epitype.

According to the protologue, *Ainsliaea pteropoda* DC. var. *silhetensis* DC., was based on specimen *Wallich cat. 2927, c.37* from Silhet. I was unable to locate this collection. However, in P, I found a sheet from Schulz Bip.’s herbarium with the label “C-37(Wallich)” (on the same sheet there is another plant from Jackemont’s herbarium n. 490). Even if the label of the specimen “C-37(Wallich)” does not show the locality mentioned in the protologue (i.e., Silhet), the sheet has Schulz Bip.’s annotations on the right-hand side (“... involucre opaco, subvillosa”), which are in accordance with the protologue of *A. pteropoda* var. *silhetensis*, i.e., “... invol. parce lanuginosa” (vs. “involucra glabrata” in *A. pteropoda* DC. from Nepal). I therefore selected the specimen *Wallich 2927, c.37* at P as lectotype of *A. pteropoda* var. *silhetensis*.

Ainsliaea pteropoda var. *silhetensis* was said to differ from *A. pteropoda* by its involucre bracts lanuginose. However, subsequent collections have shown this character to be within the range of variation for the species.

Handel-Mazzetti (1938) described *Ainsliaea heterantha* on the basis of its chasmogamous and cleistogamous florets. However, this is a variable feature throughout the range of *A. latifolia*. Therefore, the possession of chasmogamous and cleistogamous florets rules out the possibility of separate taxonomic recognition of *A. heterantha*, and this otherwise similar species is synonymized here.

Relationships. *Ainsliaea latifolia* most resembles *A. bonatii*, *A. henryi*, *A. hypoleuca*, *A. macrocephala*,

A. qianiana, and *A. spicata*, those species with winged petioles. *Ainsliaea henryi* is distinguished by its achenes glabrous or apically pilose (vs. these other species with achenes consistently pilose). Five taxa, *A. bonatii*, *A. hypoleuca*, *A. latifolia*, *A. qianiana*, and *A. spicata*, may be differentiated by their leaf blades, i.e., ovate and rounded at the base in *A. latifolia*. *Ainsliaea bonatii* has cordate leaf blades, whereas *A. spicata* has obovate or obovate to pandurate leaf blades. *Ainsliaea qianiana* is distinguished by its subglabrous and somewhat fleshy leaves. In contrast, *A. hypoleuca* has discolorous leaves that are white-tomentose below. *Ainsliaea macrocephala* may be distinguished by its larger involucre, 13–15 mm, as well as by its foliar trichomes T-shaped.

Ainsliaea latifolia is recognized in this treatment with two varieties, their distributions occasionally overlapping in Thailand. Both varieties form a reticulate pattern of morphologically intergrading populations.

Key to the varieties of *Ainsliaea latifolia* in Southeastern Asia

- 1a. Leaf blade ovate, petiole commonly equal, rarely longer than the blade. Leaves strigose (with long straight trichomes only) or strigose-lanate below (with long straight trichomes and long crisped trichomes) 17a. var. *latifolia*
- 1b. Leaf blade elliptic or narrowly ovate, petiole equal to or more commonly longer than the blade. Leaf subglabrous (with few straight trichomes only) 17b. var. *taiwanensis*

17a. *Ainsliaea latifolia* (D. Don) Sch. Bip. var. *latifolia*. Figure 30A–J.

Leaves long-petiolate, petioles (2)4–9(11) × 4–30 mm (at the upper point); leaf blade ovate, (2)5–10 × (1.5)3–8 cm, apex acute to subobtusate; concolorous, strigose on both surfaces, with long straight trichomes or more commonly slightly discolorous, with upper surface sparsely strigose, and lower surface white strigose-lanate, with a combination of the following trichomes types: short glandular biserial trichomes; long crisped trichomes; long straight trichomes, 0.3–0.8 mm. Capitula solitary or 2- to 5-fasciculate, subtended by reduced leaves or leaf-like bracts. Florets usually chasmogamous (sometimes without pappus), more rarely cleistogamous.

Distribution and phenology. Bangladesh, Bhutan, China (Guangdong, Yunnan), India, Myanmar, Nepal, and Thailand, collected from evergreen forest, usually in sunny places, among rock, from elevations between 1100 and 3600 m; flowering and fruiting throughout the year.

Representative specimens examined. BANGLADESH. “East Bengal,” *Griffith 3331* (S); “East Himalaya,” *Griffith 3331* (W). BHUTAN. “Bootan,” no further data (W 7214).

7215). CHINA. **Guangdong**: Hong Kong, Hyszen, *Exped. Biolog. Sino-Rossica* 925 (NY). **Yunnan**: Central Yunnan, Kunming, *P. I. Chiou* 59608 (CM); "Inter fluvios Djinschad-jiang ("Yangtse") et Landsang-djiang (Mekong)," *F. Handel-Mazzetti* 8501, *Diar.* Nr. 1588 (W); "Inter pagos Yungning et Dschungdien [Chungtien], in regionis calide temperatae primetis supra vicum Tschwadse," *F. Handel-Mazzetti* 7623, *Diar.* Nr. 1380 (W); "Szemao," *A. Henry* 12763 (NY, US); "Szemao," *A. Henry* 12.763B (MO); NE Yunnan, So?-kou, Sep. s.d., *E. E. Maire s.n.* (W 7227); s. loc., *R. Mauri* in 1921 (UC); Xujiaba, Jingdong Co., 28 Apr. 1981, s. coll. (HITBC 071880); Bijiang Co., behind the hill of the Middle School, 26 May 1976, s. coll. (HITBC 076243); Bijiang Co., Pihe logging center, 20 June 1978, s. coll. (HITBC 076246); Bijiang Co., Nabajiao, 8 July 1978, s. coll. (HITBC 076247); Qiubei Co., 28 Apr. 1962, s. coll. (HITBC 076250); "Zhengyuan" [Zhenyuan] Co., Sep. 1974, s. coll. (HITBC 076252); Ageju, Fugong Co., 9 Oct. 1987, s. coll. (HITBC 076258, 076265); Songming Co., 5 Sep. 1965, s. coll. (HITBC 076262). INDIA. **Assam**: Khasia, Reg. Temp., *J. D. Hooker & T. Thomson s.n.*, p.p. (C, M, NY, S, UC, W); Assam, above Karong, Manipur, *W. Koelz* 27006 (UC); Eastern Circle, Shillong, Kameng F.D. (N.E.F.A.), Bompou up hill next to Cauteen, *G. Panigrahi* 6184 (CAL); Naga Hills, Kohuna?, *D. Prain* 23896 (M); Khasia Hills, *Simond* 30405 (M). **Himachal Pradesh**: Himalaya Mtns., above Gangotry, *W. Dudgeon & L. A. Kenoyer* 36 (MO, PH); Simla, *R. Singh* 12786 (M). **Manipur**: Ukhrul, *F. Kingdon Ward* 17086 (NY); Mao, "11 Feb. 54," s. coll. 1761 (CAL). **Punjab**: Kasauli, *J. R. Drummond* 20055 (UC); Punjab, *J. R. Drummond* 25596 (UC). **Sikkim**: Reg. Temp., *J. D. Hooker & T. Thomson s.n.* (C, M, S, W); Sikkim, *J. D. Hooker & T. Thomson s.n.* (W 16496); Darjeeling, *W. Koelz* 10517 (M); "Darshiling," *O. Kuntze* 6695 (NY); Sikkim, *A. Meebold* 838 (S). **Uttar Pradesh**: NW India, Mussoorie, *R. Kirat* in 1932 (NY, S), *R. Kirat* in 1926 (S); Mussoorie, *R. R. Stewart* 15787 (NY). **Unknown**: Joacinsan?, Bemo Kathijan?, *J. F. Duthie* 12985 (CAL); no further data, *Jackemont* 490 (P); NW Himalaya, s.d., *Mackinnon s.n.* (CAL 253998A); NW Himalaya, *Stolitzka* in 1864 (W); "Ind. Orient.," no further data, *Wallich* C-44 (S). MYANMAR [BURMA]. North Burma, Hpore Pass, *F. Kingdon Ward* 447 (NY); Burma, Sirhoi, *F. Kingdon Ward* 18260 (NY); NE Burma, Kambaiti, 73 km E of Myitkyina, *R. Malaise* 158 (S), *R. Malaise* 186 (S). NEPAL. Chusiakana, *Biskam* 13 (UC); Kali Gandaki, above Uleri, *Clifford G. Rice* 10-78 (US); Nepalia, "Kamaon Ind. or.," *J. D. Hooker & T. Thomson s.n.* (NY, W); Bagmati zone, NW slope of Nagarjung Hill, *D. H. Nicolson* 2955 (US); "Nepalia, 1821," *Wallich s.n.* (M, NY, P (photo LP), W). THAILAND. **Chiang Mai**: Doi Inthanond, *K. Bunchuai* 1437 (BKF, C); Doi Chiang Dao, *R. Geesink et al.* 8170 (AAU, BKF, C); Doi Inthanon, *H. Koyama & C. Phengklai* T-39997 (BKF); Doi Pha Hom Pok, Fang Distr., *H. Koyama et al.* T-33444 (BKF); Doi Inthanond, *T. Smitinand & I. Alsterlund* 6695 (BKF); Chiangmai, Doi Chiengdao, *T. Smitinand & J. A. R. Anderson* 7323 (BKF); Inthanond, *T. Smitinand et al.* 10299 (BKF); Chiangmai, "Doi Angka," *Winit* 1344 (BKF). **Kanchanaburi**: Khao Kamphaeng, Tham Than Lod National Park, Srisawat Distr., *H. Koyama et al.* T-30524 (AAU, BKF, C). **Unknown**: "Siam Forest Service, Doi Dawk, Charomtawng," *H. Garrett* 618 (AAU, BKF).

17b. *Ainsliaea latifolia* (D. Don) Sch. Bip. var. ***taiwanensis*** S. E. Freire, var. nov. TYPE: Taiwan. Ilan Hsien, Taroko Nat. Park, valley at 3.5 km from Yunling Camp (ca. 12.5 km below

Nanhutashan by trail), 7 Sep. 1991, *W. L. Wagner* 6516 (holotype, MO!). Figure 30K.

Leaves very long-petiolate with petioles broadly winged, 5–11 × 6–18 mm (at the upper point); leaf blades elliptic or narrowly ovate, (2.5)4.5–9 × 1.5–3(3.5) cm, apex acute; subglabrous on both surfaces with long straight trichomes along the main veins. Capitula solitary or 2- to 5-fasciculate. Florets usually cleistogamous.

Distribution and phenology. Collected from mossy sites in evergreen forest by streams, between 1700 and 2650 m, from Taiwan, Indonesia (Sumatra), and southern Thailand; flowering in January, February, May, and August, flower bud in June, July, September, October, and December.

Discussion. Most collections of var. *latifolia* have pilose leaves, with ovate leaf blades. However, collections principally from Taiwan (also a few collections from Thailand and only one from Sumatra) are nearly glabrous, with narrowly ovate leaf blades and petiole equal to or more commonly longer than the blade. Otherwise they resemble var. *latifolia*. Consequently, I propose the new variety var. *taiwanensis*.

Representative specimens examined. INDONESIA. **Sumatra**: Sidikalang, *H. Koerper s.n.* (M). TAIWAN. **Ilan**: Szu-yuan, Ilan Co., *C. C. Chuang & M. T. Kao* 2474 (AAU, UC); Ilan Co., Taipingshan, *S. F. Huang* 4990 (CANB, CM); Ilan, rd. from Mt. Chung-yang-chien to Nan-shan (Piyanan), along Hagapalis River, *M. Tamura & H. Koyama* 23729 (S); Ilan, rd. from Mt. Chung-yang-chien to Nan-shan (Piyanan), betw. Matakotou River & Kurimukan, *M. Tamura & H. Koyama* 23780 (S). **Nan-tou**: Nan-tou, Mt. Neng-kao, betw. Tien-chin (Noko) & Yun-hai (Onoe), *M. Tamura & H. Koyama* 23388 (S). **Unknown**: Mt. Taiheizan, *S. Suzuki* 549 (S), *S. Suzuki* 9513 (S). THAILAND. **Chiang-Mai**: Doi Anga-Kette, *C. C. Hosseus* 358a (MO, C, M, W); Doi Pha Hom Pok, Fang Distr., *H. Koyama et al.* T-33435 (AAU, BKF, C); Doi Inthanod, *G. Murata et al.* T-15998 (BKF, C); Doi Inthanod, Payap, *M. Tagawa et al.* T-2866 (BKF). **Unknown**: Doi Anga, *H. Garrett* 643 (BKF).

18. *Ainsliaea macrocephala* (Mett.) Y. C. Tseng, *Acta Phytotax. Sin.* 31(4): 364. 1993. Basionym: *Ainsliaea pteropoda* var. *macrocephala* Mett., *Notizbl. Bot. Gart. Berlin-Dahlem* 11: 107. 1931. TYPE: China. Yunnan: Likiang, 3500 m, 1 Sep. 1914, *C. Schneider* 2328 (lectotype, designated here, K!; duplicates, K photo LP!, US!). Figure 31.

Plants perennial, herbaceous, 0.45–0.60 m tall; stems erect, unbranched, with few leaves much reduced, lanuginose. Leaves basally clustered, rosulate, long-petiolate with petioles broadly winged, slightly narrowed to the base, 5–8 × 0.7–0.9 cm (at the upper point); leaf blades slightly fleshy, ovate,



Figure 31. *Ainsliaea macrocephala* (Mattf.) Y. C. Tseng. —A. Habit. —B. Foliar trichome. —C. Phyllaries. —D. Capitulum. —E. Chasmogamous floret. —F. Stamen. —G. Style branches. Scale bars: A = 3 cm; B = 0.3 mm; C–E = 5 mm; F = 2 mm; G = 1 mm. Drawn from the paratype *Rock 5773* (US).

2.5–7 × 1.5–4.5 cm, apex acute to subobtuse, base rounded, margins obscurely denticulate; sericeous on both surfaces with long T-shaped trichomes, 3–4 mm; palmati-pinnate, 3-nerved; cauline leaves alternate,

short-petiolate to sessile, ovate to lanceolate, ca. 3 × 1.5 cm. Capitula sessile or short-pedunculate, arranged in a stachyoid inflorescence; involucre 6- or 7-seriate, cylindrical, 13–15 × 2.5–4 mm; phyllaries

subcoriaceous, margins purple, densely strigose; outer phyllaries ovate, acute, $3\text{--}3.5 \times 2$ mm; inner phyllaries linear, acuminate, midvein dark, $9\text{--}14 \times 0.7\text{--}1$ mm. Florets 3, hermaphrodite, chasmogamous; corollas deep rose, ligulate, $13\text{--}14$ mm, lobes $5\text{--}7$ mm (deeper slit $7\text{--}8$ mm), tube $5\text{--}7$ mm; anthers dark red, $7\text{--}7.4$ mm, apical appendages rounded, $1\text{--}1.5$ mm, sagittate; tails smooth to slightly pilose, $2.2\text{--}3$ mm; style branches short, rounded, $0.3\text{--}0.5$ mm. Achenes oblong, ca. 4 mm, 11-nerved, densely pilose; pappus bristles ca. 55, $7.5\text{--}9$ mm.

Distribution and phenology. Collected from alpine conifer forest in China (Yunnan), from dry stony sites among scrub, from elevations between 3500 and 3600 m; flowering in August and September.

Discussion. Because no herbarium was mentioned for the type specimen in the protologue of *Ainsliaea pteropoda* var. *macrocephala*, I propose the collection kept at K as lectotype because it is better preserved.

Relationships. *Ainsliaea macrocephala* most resembles *A. latifolia*. Both have ovate leaves that are long-petiolate, with winged petioles. They may be differentiated by their leaf trichomes and involucre, i.e., *A. macrocephala* has larger involucre, $13\text{--}15 \times 2.5\text{--}4$ mm and foliar trichomes T-shaped (vs. $8\text{--}10 \times$ ca. 4 mm and a combination of long straight and long crisped trichomes, respectively, in *A. latifolia*).

Representative specimens examined. CHINA. **Yunnan:** Likiang valley, G. Forrest 6545 (paratype, UC, W); Prope urbem Lidjiang ("Likiang") in Mt. Yülung-schan, F. Handel-Mazzetti 3619 (W); Likiang, J. F. Rock 5628 (paratype, NY), J. F. Rock 5773 (paratype, UC, US); Zhongdian Co., Biandong, 19 June 1963, s. coll. (HITBC 076263).

19. *Ainsliaea mairei* H. Lév., in Le Monde des Plantes 18: 31. 1916. TYPE: China. Yunnan: Mt. Io-Chan, 3200 m, Nov. 1912, E. E. Maire s.n. (holotype, E!). Figure 32.

Plants perennial, herbaceous, ca. 0.40 m tall; stems erect, unbranched, leafy, strigose. Leaves basally clustered, rosulate, sessile; leaf blades chartaceous, linear to obovate, $8\text{--}14 \times 1.5\text{--}2.5(3.5)$ cm, apex acute, attenuate at the base, margins entire to obscure denticulate; slightly discolorous, upper surface dark green, under surface paler, sericeous on both surfaces with long T-shaped trichomes, ca. $2.5\text{--}3$ mm; palmati-pinnate, 3-nerved; cauline leaves alternate, sessile, linear to elliptic, gradually reduced upward to the base of the inflorescence, $2.5\text{--}4 \times 0.5\text{--}0.8$ cm. Capitula sessile, arranged in a stachyoid inflorescence; involucre 5- to 7-seriate, narrowly campanulate, $10\text{--}12 \times 4\text{--}7$ mm; phyllaries subcoriaceous, purple; outer phyllaries ovate, acute, ca. 3×1 mm,

dorsally strigose; inner phyllaries linear to elliptic, acute, midvein dark, ca. 12×2 mm, glabrous. Florets, 2 or 3, hermaphrodite, chasmogamous; corollas pink, ligulate, $10\text{--}12$ mm, lobes ca. $5\text{--}6$ mm (deeper slit $6\text{--}7$ mm), tube $4\text{--}5$ mm; anthers deep rose, $4.5\text{--}7$ mm, apical appendages rounded, ca. 1 mm, sagittate; tails $1.5\text{--}2$ mm, smooth to slightly pilose; style branches short, rounded, ca. 0.4 mm. Achenes oblong-obovate, ca. 4 mm, 10-nerved, densely pilose, pappus bristles ca. 36, ca. 9 mm.

Distribution and phenology. China (Sichuan, Yunnan), growing on mountain slopes between 1800 and 3500 m, commonly on sandy soils; collected in flower in September and November.

Relationships. *Ainsliaea mairei* resembles *A. macrocephala* and *A. yunnanensis*, species with villose leaves (T-shaped trichomes) and capitula arranged in unilateral spikes. *Ainsliaea mairei* may be distinguished by its leaves linear to obovate, slightly narrowed at the base (vs. ovate and abruptly contracted at the base in *A. macrocephala* and *A. yunnanensis*).

Representative specimens examined. CHINA. **Sichuan:** Prope castellum Kwapi ad septentr. oppidi Yenyüen, F. Handel-Mazzetti 2485, Diar. Nr. 977 (W). **Yunnan:** "Yünnanfu" [Kunming], J. Cavalerie 20 (S); "Yünnanfu," Mt. Landjigu, F. Handel-Mazzetti 5683, Diar. Nr. 991 (W); "Yun-nan-sen," E. E. Maire 921 (UC); "Tong-Tchouan," E. E. Maire 3936 (NY, S, UC); "Yünnanfu-Suifu," R. Mell in 1914 (W).

20. *Ainsliaea nana* Y. C. Tseng, Acta Phytotax. Sin. 31 (4): 365. 1993. TYPE: China. Sichuan: Tianquan, 27 Aug. 1948, Chung-luen Wu 12307 (holotype, NAS not seen).

Plants perennial, herbaceous, $0.11\text{--}0.18$ m tall; stems erect, unbranched, naked. Leaves basally clustered, rosulate, long-petiolate, petioles wingless, $1\text{--}2.3$ cm; leaf blades chartaceous, ovate, $7\text{--}16 \times 5\text{--}10$ mm, obtuse at the apex, base slightly cordate, margins denticulate; upper surface green, lower surface purple; palmati-pinnate, 3-nerved. Capitula pedunculate, arranged in thyrsoid inflorescence; peduncles $5\text{--}15$ mm long, glabrous; involucre 5-seriate, cylindrical, ca. 3 mm broad; phyllaries purple, glabrous; outer phyllaries ovate or ovate to lanceolate, obtuse, $1\text{--}3.5 \times 0.8\text{--}1$ mm; inner phyllaries lanceolate to linear or oblong, acute to acuminate, ca. $7 \times 0.7\text{--}0.9$ mm. Florets 3, hermaphrodite, chasmogamous; corolla ligulate, ca. 9 mm, lobes $4\text{--}5$ mm; anthers ca. 7 mm, apical appendages rounded, sagittate; tails ca. 1 mm; style branches short, rounded, ca. 1 mm. Achenes obovate, ca. 4 mm, 10-nerved, glabrous; pappus bristles ca. 4 mm, margins plumose.

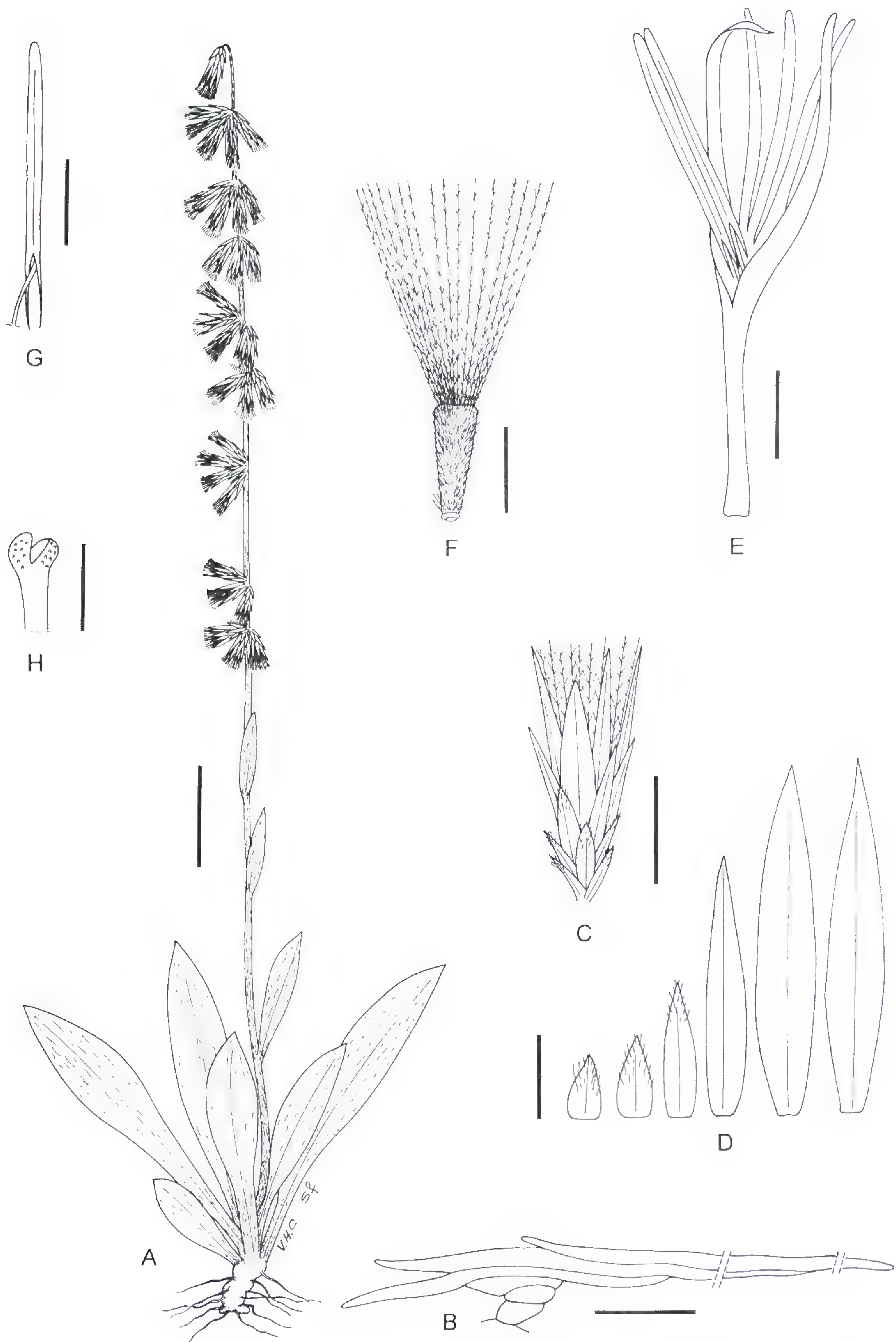


Figure 32. *Ainsliaea mairei* H. Lév. —A. Habit. —B. Foliar trichome. —C. Capitulum. —D. Phyllaries. —E. Chasmogamous floret without pappus and ovary. —F. Achene with pappus. —G. Stamen. —H. Style branches. Scale bars: A = 3 cm; B = 0.2 mm; C = 5 mm; D, F = 3 mm; E, G = 2 mm; H = 1 mm. Drawn from A, C–H, *Maire 3936* (S); B, the holotype *Maire in 1912* (E).

Distribution and phenology. At present known only from the type collection from Sichuan (China) at 2400 m; flowering in August.

Relationships. *Ainsliaea nana* seems to be distinguished by its small habit, leaves long-petiolate, with leaf blades ovate-cordate and purplish below, and achenes glabrous.

Unfortunately, no material was available from this species, so the description is based on the original diagnosis.

Representative specimens examined. CHINA. **Sichuan:** Mt. Emei, *Guanghui Yang* 57464, 57474 (paratype, NAS not seen), *Xian-yu He* 6356 (paratype, NAS not seen); Anxian, *Wen-Kwang Hu* 13377 (paratype, NAS not seen).

- 21. *Ainsliaea nervosa*** Franch., Bull. Mus. Hist. Nat. (Paris) 1: 64. 1895. TYPE: China. Yunnan: Long-Ki, Apr. 1894, *J. M. Delavay* 4939 (holotype, P not seen; isotypes, P photo LP!, P!). Figure 33.

Plants perennial, herbaceous, 0.25–0.50 m tall; stems erect, unbranched, leafy, subglabrous. Leaves basally clustered, rosulate, long-petiolate with petioles wingless, petioles 6–10 cm long, flat; leaf blades subcoriaceous, narrowly elliptic to narrowly lanceolate, 9–10 × 2–2.5 cm, apex acute, base longly attenuate into the petiole, margins obscurely denticulate; upper surface glabrous, deep green, and lower surface paler, loosely strigose, paler, glabrate at maturity, with long straight trichomes; palmati-pinnate, 3-nerved, these major veins subparallel; cauline leaves alternate, sessile, linear to elliptic, much reduced. Capitula short-pedunculate, arranged in thyrsoid inflorescence; involucre 5- or 6-seriate, broadly cylindrical, ca. 10 × 5–7 mm; phyllaries papyraceous, all with long biseriate glandular trichomes; outer phyllaries ovate, acute, ca. 2 × 1.3 mm; inner phyllaries linear to elliptic, acute, midvein dark, ca. 10 × 1 mm. Florets 3, hermaphrodite, chasmogamous and cleistogamous (at different or same seasons); corollas pink; *chasmogamous florets* with corollas ligulate, ca. 8.5 mm, lobes ca. 4 mm (deeper slit ca. 4.5 mm), tube ca. 4 mm; anthers ca. 3.5 mm, apical appendages rounded, ca. 0.7 mm, sagittate; tails ca. 1 mm, shortly pilose; style branches short, rounded, ca. 0.3 mm. Achenes obovate to elliptic, ca. 2 mm, 10-nerved, densely pilose; pappus bristles 25 to 30, ca. 6 mm, white; *cleistogamous florets* with corollas tubulose to pseudoligulate, ca. 4.2 mm, lobes ca. 0.3 mm (deeper slit ca. 0.5 mm); anthers ca. 2 mm; style branches ca. 0.4 mm. Achenes ca. 2.5 mm; pappus bristles ca. 6 mm.

Distribution and phenology. China (Sichuan, Yunnan), collected on rocky slopes along the stream at elevations between 1500 and 1800 m; flowering in April, fruiting in October and November.

Relationships. *Ainsliaea nervosa* is closely related to *A. glabra* var. *sutchuenensis*. Both taxa have leaves long-petiolate, achenes pilose, and corollas pink. However, the leaves in *A. nervosa* are narrowly lanceolate, and the phyllaries are papyraceous with long biseriate glandular trichomes. On the contrary, *A. glabra* var. *sutchuenensis* has leaves broadly elliptic and phyllaries that are glabrous or scarcely strigose, with short biseriate glandular trichomes.

Representative specimens examined. CHINA. **Sichuan:** O-Pien Hsien, *Y. S. Liu* 2325 (US); Ping-shan Hsien, *F. T. Wang* 22682 (KUN); Mt. Omei, *E. Faber* 128 (K, in the same sheet as the type of *A. glabra*, i.e., *E. Faber* 391).

- 22. *Ainsliaea paucicapitata*** Hayata, Icon. Pl. Formos. 8: 71. 1919. TYPE: Taiwan. Nökösan, 9000 ft., Jan. 1908, *U. Mori* s.n. (type, TI not seen; TI photo LP!). Figure 34.

Plants perennial, herbaceous, ca. 0.20 m tall; stems erect, unbranched, naked. Leaves basally clustered, rosulate, long-petiolate with petioles wingless, 1–1.5 cm; leaf blades deltoid, 1–1.5 × 1–1.5 cm, acute at the apex, base cordate, margins obscurely denticulate; palmati-pinnate, 3- to 5-nerved. Capitula sessile, arranged in a stachyoid inflorescence; involucre campanulate, ca. 10 mm; outer phyllaries ovate, inner phyllaries linear to lanceolate. Florets 3, hermaphrodite, chasmogamous; corollas ligulate, ca. 10 mm, 5-lobed, lobes ca. 5 mm. Achenes oblong to elliptic, densely pilose; pappus bristles with margins plumose.

Distribution and phenology. This species, at present, is only known from type locality of Taiwan (Nökösan) at ca. 3000 m; flowering in January.

Relationships. *Ainsliaea paucicapitata* resembles *A. apiculata* var. *apiculata*, from Japan. Both species have leaves long-petiolate, with leaf blades that are subrotundate, and the capitula arranged in spikes. *Ainsliaea paucicapitata* is clearly distinguished by its leaf blades that are shallowly 5-lobed (vs. shallowly 5-lobed to 5-angled) and its leaves basally rosulate (vs. leaves clustered above stem base).

Unfortunately, no material was available from this species, so the description is based on the original diagnosis by Hayata (1919) and the photo of the type distributed by TI.

- 23. *Ainsliaea pentaflora*** S. E. Freire, Novon 12: 451. 2002. TYPE: Vietnam. Tonkin: Massif du

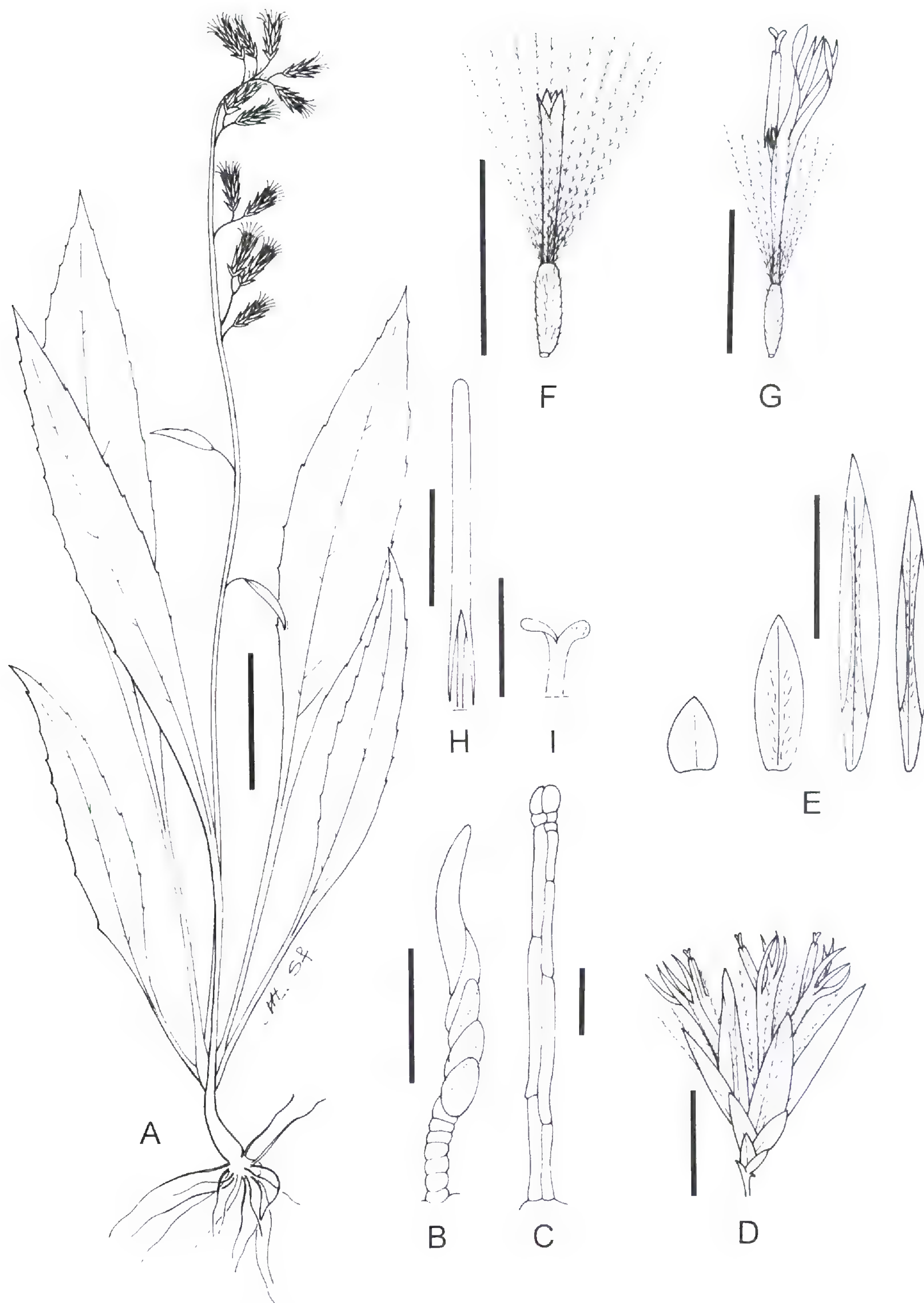


Figure 33. *Ainsliaea nervosa* Franch. —A. Habit. —B, C. Foliar trichomes. —D. Capitulum. —E. Phyllaries. —F. Cleistogamous floret. —G. Chasmogamous floret. —H. Stamen of chasmogamous floret. —I. Style branches of chasmogamous floret. Scale bars: A = 3 cm; B, C = 0.1 mm; D–G = 5 mm; H, I = 1.5 mm. Drawn from A–E, G–I, the isotype *Delavay 4939* (P); F, *Liu 2325* (US).

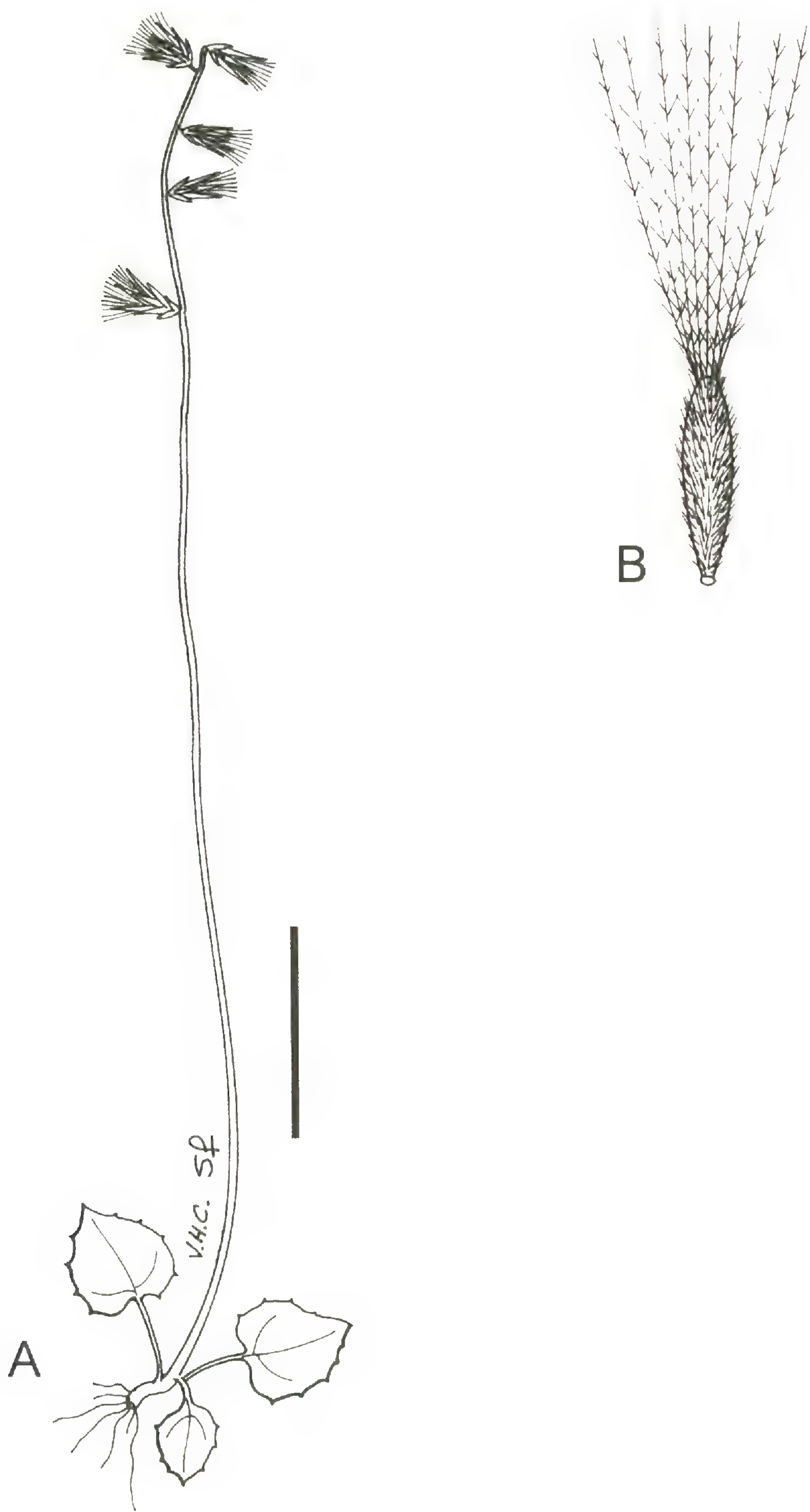


Figure 34. *Ainsliaea paucicapitata* Hayata. —A. Habit. —B. Achene with pappus. Scale bars: A = 3 cm; B = (scale unknown). Drawn from A, the photo of type *U. Mori* s.n. (FI); B, redrawn from an outline of the photo of the type.

Tom Dav, 900 m, Dec. 1921, *A. Pételot* 417 (holotype, C!; isotype, NY!).

Plants perennial, herbaceous, 0.35–0.45 m tall; stems erect, unbranched, leafy, strigose. Leaves basally clustered, rosulate, long-petiolate; petioles wingless, 6.5–9 cm long, strigose; leaf blades chartaceous, ovate, 7.5–11 × 3.5–6 cm, apex acute, base abruptly rounded, then cuneately narrowed into the petiole, margins denticulate; upper surface slightly scabrous, sparsely strigose to glabrous, with straight trichomes, 0.7–1.25 mm, lower surface moderately strigose, veins somewhat more densely pubescent; palmati-pinnate, 3-nerved; cauline leaves few, much reduced, ovate to elliptic. Capitula sessile, arranged in thyrsoid inflorescences; involucre 6- or 7-seriate, narrowly campanulate, 13–15 × 12–14 mm; phyllaries coriaceous, apically villose; outer phyllaries oblong to ovate, acute, ca. 4 × 1.5 mm; inner phyllaries linear to elliptic, acute, midvein dark, 10–10.5 × 1.5–1.7 mm. Florets 5, hermaphrodite, cleistogamous; corollas tubulose to pseudoligulate, 4.5–5.5 mm, 5-lobed, lobes ca. 1 mm (deeper slit ca. 1.5 mm); anthers ca. 3 mm, apical appendages truncate, ca. 0.4 mm, sagittate; tails 0.8 mm, shortly pilose; style branches short, obtuse, ca. 1.2 mm. Achenes oblong, ca. 4 mm, 10-nerved, pilose; pappus bristles ca. 39, 7.5–8 mm.

Distribution and phenology. Vietnam (Tonkin), between 900 and 1400 m (Fig. 3B); collected in flower in April and December.

Relationships. *Ainsliaea pentaflora* most resembles *A. latifolia*. Both have ovate leaves arranged in a basal rosette and apical anther appendages that are rounded. *Ainsliaea pentaflora* differs from *A. latifolia* by its 5-flowered capitula, and its practically wingless petioles. In contrast, the capitula of *A. latifolia* are 3-flowered and the petioles are winged. Two other species of the genus also present capitula 5-flowered, i.e., *A. brandisiana* from Burma and *A. spanocephala* Y. C. Tseng from Thailand. Both species have acuminate apical anther appendages (vs. truncate apical anther appendages in *A. pentaflora*).

Representative specimens examined. VIETNAM. Tonkin: Massif du Tom Dav, *A. Pételot* 4551 (NY, US).

24. *Ainsliaea pertyoides* Franch., J. Bot. (Morot) 2: 70, t. 3. 1888. TYPE: China. Yunnan: In dumetis, solo calcareo, ad fauces Kien-min-keou, prope Mo-so-yn, 23 Jan. 1885, *J. M. Delavay* 1218 (lectotype, designated here, P!). Figure 35.

Ainsliaea sparsiflora Vaniot, Bull. Acad. Int. Géogr. Bot. 12: 118. 1903. *Ainsliaea pertyoides* f. *sparsiflora* (Vaniot)

Beauverd, Bull. Soc. Bot. Genève, Sér. 2, 1: 384. 1909. *Ainsliaea pertyoides* var. *sparsiflora* (Vaniot) H. Lév., Cat. pl. Yun-Nan: 37. 1915. TYPE: China. Yunnan: “Environs de Yu-nan-sen, bois de la pagode de He-long-tan,” 24 Feb. 1897, *E. Bodinier* 79 (holotype, P!; isotype, E!).

Small shrubs, 0.50–0.80 m tall; stems erect, branched and leafy above, with numerous axillary branches, simple and naked below the inflorescence, strigose. Leaves distichous, alternate, short-petiolate with petioles wingless, 2–3 mm; leaf blades subcoriaceous, ovate to oblong, 4–5.5 × 2–3 cm, apex acuminate, rounded to slightly cordate at the base, margins entire to obscurely denticulate; palmati-pinnate, 3-nerved. Branch leaves smaller than the others of the principal stem. Capitula sessile or short-pedunculate, arranged in thyrsoid and leafy inflorescence; involucre 5- or 6-seriate, cylindrical to campanulate, ca. 14 × 5 mm; phyllaries subcoriaceous, apically strigose; outer phyllaries ovate or ovate to elliptic, acute, 1–3 × 1–1.5 mm; inner phyllaries linear to elliptic, acute, midvein dark, ca. 13 × 1.5 mm. Florets 3, hermaphrodite, chasmogamous; corolla white, pink above, ligulate, ca. 13 mm, lobes ca. 5 mm (deeper slit ca. 6 mm), tube ca. 7 mm; anthers ca. 7.5 mm, apical appendages truncate, ca. 1 mm, sagittate; tails ca. 2 mm, shortly pilose; style branches short, rounded, ca. 0.5 mm. Achenes oblong, ca. 3 mm, 10-nerved, densely pilose; pappus bristles ca. 40, ca. 7.5 mm.

Relationships. *Ainsliaea pertyoides* appears to occupy an isolated position in the genus by the distinctive stem branched and leafy above. This habit resembles the genus *Pertya*. However, the pappus bristles with margins plumose of *A. pertyoides* (vs. scabrid in *Pertya*) relate this species to *Ainsliaea*.

Distribution. Restricted to southwestern China (Guizhou, Yunnan), between 1500 and 2600 m (Fig. 6B).

Discussion. Three specimens from Yunnan are mentioned in the protologue of *Ainsliaea pertyoides*: “In dumetis, solo calcareo, ad fauces Kien-min-keou, prope Mo-so-yn, 23 Jan. 1885, *J. M. Delavay* 1218” (P); “In umbrosis silvarum ad Peetsao-lo, supra Mo-so-yn, 9 Apr. 1886” (not located); “In silvis ad Ta-long-tan prope Tapin-tze, 1800 m, 20 Jan. 1887, *J. M. Delavay* 2313” (P, US). I selected as lectotype *Delavay* 1218 kept at P, because it is better preserved.

Key to the varieties of *Ainsliaea pertyoides* in China

- 1a. Leaves light green below (with long straight trichomes only) 24a. var. *pertyoides*
- 1b. Leaves white-lanate below (with long straight trichomes and long crisped trichomes) 24b. var. *albotomentosa*



Figure 35. *Ainsliaea pertyoides* Franch. A–F. *A. pertyoides* var. *pertyoides*. —A. Habit. —B. Capitulum. —C. Phyllaries. —D. Chasmogamous floret. —E. Stamen. —F. Style branches. —G, H. *A. pertyoides* var. *albotomentosa* Beauverd. Foliar trichomes. Scale bars: A = 3 cm; B–D = 5 mm; E, F = 2 mm; G = 0.1 mm; H = 0.2 mm. Drawn from A–C, *Rock 4072* (US); D–H, *Delavay in 1888* (UC).

24a. *Ainsliaea pertyoides* Franch. var. *per-tyoides*. Figure 35A–F.

Leaves green on both surfaces, slightly discolorous, with upper surface glabrous and lower surface reddish green, sparsely strigose, with long straight trichomes.

Distribution and phenology. Restricted to southwestern China (Yunnan). This variety was collected in forest in shady places at elevations between 1500 and 2000 m, in calcareous or sandy soils; flowering in February and March.

Representative specimens examined. CHINA. **Yunnan:** “Hu che kou, près de Mo so yn,” 28 Jan. 1889, *J. M. Delavay s.n.* (S); “in silvis ad Ta-long-tan prope Tapin-tze,” *J. M. Delavay* 2313 (paratype of *Ainsliaea pertyoides*, P, US); Lou Kiuen, *F. Ducloux* 256 (UC); “Infra vicum Hsinlung trans flumen Pudu-ho ad Septentr. urbis. Yünnanfu” [Kun-ming], *F. Handel-Mazzetti* 511, *Diar. Nr.* 120 (M, W); “Mengtze” [Mengsi], *A. Henry* 9882A (MO); “Szemeo” [Simao], *A. Henry* 9882B (MO, NY); mountains S of “Likiang” [Lijiang], near Hochin and Chiuho, *J. F. Rock* 4072 (US).

24b. *Ainsliaea pertyoides* Franch. var. *albotomentosa* Beauverd, Bull. Soc. Bot. Genève, Sér. 2, 1: 384. 1909. TYPE: China. Yunnan: Yu-nan-sen, Feb. 1904, *F. Ducloux* 254 (lectotype, designated here, UC!; duplicate, NY!). Figure 35G, H.

Ainsliaea ovalifolia Vaniot, Bull. Acad. Int. Géogr. Bot. 12: 119. 1903. *Ainsliaea pertyoides* f. *ovalifolia* (Vaniot) Beauverd, Bull. Soc. Bot. Genève, Sér. 2, 1: 384. 1909. *Ainsliaea pteropoda* DC. f. *ovalifolia* (Vaniot) H. Lév., Cat. Pl. Yun-Nan: 37. 1915. TYPE: China. Yunnan: Yu-nan-sen bois de la pagode de He-long-tan, 24 Feb. 1897, *Bodinier & Deblenne* 78 (lectotype, designated here, K!; duplicate, W!).

Ainsliaea pertyoides var. *intermedia* Beauverd, Bull. Soc. Bot. Genève, Sér. 2, 1: 384. 1909. TYPE: China. Yunnan: Yun-nan-sen, à Lan-ngy-tsin près Lou lan, Jan. 1907, *F. Ducloux* 296 (lectotype, designated here, NY!; duplicate, UC!).

Leaves strongly discolorous, with upper surface dark green, glabrous, and lower surface densely white-lanate, with long crisped trichomes mixed with long straight trichomes.

Distribution. China (Guizhou, Yunnan). Although this variety occurs within the range of var. *per-tyoides*, it was collected from 2000 to 2600 m; flowering in January, March, April, September, and October.

Discussion. Two specimens from Yunnan are mentioned in the protologue of *Ainsliaea pertyoides* Franch. var. *albotomentosa*: “Yu-nan-sen, Feb. 1904, *F. Ducloux* 254” and “Yun-nan-sen, Mar. 1905, *E. E. Maire s.n.*” Because I was unable to locate the

collection *E. E. Maire* in 1905, I chose *F. Ducloux* 254, kept at UC, as the lectotype of var. *albotomentosa*.

Because no herbaria were mentioned for the type specimens in the protologues of *Ainsliaea ovalifolia* and *A. pertyoides* var. *intermedia*, I propose the collections kept at K and NY, respectively, as lectotypes because they are better preserved.

Representative specimens examined. CHINA. **Guizhou:** “Kweichou,” *J. Cavalerie* 4212 (UC, W), *J. Cavalerie* 7485 (W). **Yunnan:** “Yunnanfu” [Kun-ming], *J. Cavalerie* 19 (S); Central-Yunnan, Xundian, *P. I. Chiou* 042 (CM); Ta-long-tang, *J. M. Delavay* in 1888 (UC); 12 Jan. 1889, *J. M. Delavay s.n.* (UC); Hu che kou, près de Mo so yn, 28 Jan. 1889, *J. M. Delavay s.n.* (UC); Ly Ma Teou, près Lou-Lan, *F. Ducloux* 295 (NY, UC); “Lan-ngy-Asin,” *F. Ducloux* 2348 (P); environs de Hay-tien, *F. Ducloux* 2418 (P); région de Kiao-Kia, *F. Ducloux* 6028 (NY); environs de Yunnan-sen, *F. Ducloux* 2271 (P); Prope vicum Sanyingpan ad septentr. urbis Yünnanfu, *F. Handel-Mazzetti* 582, *Diar. Nr.* 145 (W); Mi-lê district, *A. Henry* 9926 (MO); Yunnan-sen, *E. E. Maire* 102 (UC); San-tao-keou, *E. E. Maire* 352 (W); Yunnan-sen, *E. E. Maire* 1084, 2401 (UC); Montagneson Siao-bo, *E. E. Maire* 2517 (NY, UC); Ma-li-ouan, Jan., s.d., *E. E. Maire s.n.* (W 16887); Yun-nan-sen, *E. E. Maire* in 1905 (paratype of *A. pertyoides* var. *albotomentosa*, not seen).

25. *Ainsliaea pingbianensis* Y. C. Tseng, Acta Phytotax. Sin. 31: 365. 1993. TYPE: China. Yunnan: Pingbian, 1780 m, 6 May 1954, *P. Mao* 4186 (holotype, IBSC not seen; isotype, IBSC photo LP!). Figure 36.

Plants perennial, herbaceous, 0.30–0.50 m tall; stems erect, unbranched below the inflorescence, leafy and strigose. Leaves basally clustered, rosulate, long-petiolate; petioles wingless, 4–11 cm, densely fulvo-strigose; leaf blades subcoriaceous, oblong to elliptic or oblong to lanceolate, 8–12 × 3–6 cm, apex obtuse, base rounded, margins shallowly denticulate and curved-ciliate; strigose on both surfaces with long straight trichomes, ca. 2.5–4 mm; palmati-pinnate, 3-nerved; cauline leaves short-petiolate, similar to the basal, gradually reduced upward to the base of the inflorescence. Capitula short-pedunculate, arranged in thyrsoïd inflorescence; involucre 5- or 6-seriate, cylindrical, ca. 9 × 3–4 mm; phyllaries papyraceous, dorsally slightly pilose; outer phyllaries ovate, acuminate to acute, 1–2.5 × 0.9–1.5 mm; inner phyllaries ovate to lanceolate or ovate to elliptic, acuminate to acute, usually 3- to 5-nerved, 7–10 × 1–2.2 mm. Florets 3, hermaphrodite, chasmogamous and cleistogamous (at different seasons); *chasmogamous florets* (not seen, described from the original diagnosis) with corollas ligulate, ca. 9 mm, lobes ca. 4 mm. Achenes ca. 3.6 mm; pappus bristles ca. 7 mm; *cleistogamous florets* with corollas tubulose to pseudoligulate, ca. 4 mm, lobes ca. 0.4 mm (deeper



Figure 36. *Ainsliaea pingbianensis* Y. C. Tseng. —A. Habit. —B. Foliar trichome. —C. Capitulum. —D. Phyllaries. —E. Cleistogamous floret. —F. Stamen. —G. Style branches. Scale bars: A = 3 cm; B = 0.1 mm; C, D = 2 mm; E = 1 mm; F, G = 0.5 mm. Drawn from *Chen 15094* (MO).

slit ca. 0.6 mm); anthers ca. 1.7 mm, apical appendages short-apiculate, 0.5 mm, sagittate; tails smooth to slightly pilose, ca. 0.5 mm; style branches short, obtuse to acute, ca. 0.5 mm. Achenes oblong, attenuate at the base, ca. 4 mm, 10-nerved, densely pilose; pappus bristles 24 to 44, ca. 6 mm.

Distribution and phenology. Southern China (Guangdong, Sichuan, Yunnan); collected at elevations between 1300 and 1800 m; flowering in November and December (flower bud in July).

Relationships. *Ainsliaea pingbianensis* resembles *A. fulvipes*. Both species have leaves in a basal rosette, with leaf blades that are oblong to elliptic, petioles densely strigose, and capitula 3-flowered. However, the leaf blades of *A. pingbianensis* are larger (8–12 cm long vs. 3–7.5 cm), the style branches are obtuse to acute (vs. truncate), and the apical anther appendages are short-apiculate (vs. rounded).

Representative specimens examined. CHINA. **Guangdong:** Canton, Guangdong 77 Team 5555 (MO). **Sichuan:** Kansei, S. Q. Chen 15094 (MO); Kansei, Z. Zhang 13248 (MO). **Yunnan:** Hekou, W. Liu 634 (paratype, IBSC not seen); Malipo, K. Feng 12790 (paratype, IBSC not seen).

26. *Ainsliaea qianiana* S. E. Freire, Novon 12: 453. 2002. TYPE: China. Yunnan: Colline de Kintchong-chan, s.d., 2990 m, *E. E. Maire* 2529 (holotype, W!; isotypes, NY!, UC!).

Plants perennial, herbaceous, 0.50–0.60 m tall; stems erect, unbranched, with few leaves much reduced, moderately strigose. Leaves basally clustered, rosulate, long-petiolate; petioles winged, $10\text{--}11 \times 0.8\text{--}1$ cm (at the upper point); leaf blades slightly fleshy, elliptic or elliptic to ovate, $7.5\text{--}8.5 \times 3.5\text{--}3.8$ cm, apex acute to subobtuse, base abruptly rounded and decurrent into the petiole, margins denticulate, with long straight trichomes, 0.6–1 mm long; upper and lower surfaces glabrous, the surface paler below; palmati-pinnate, 3-nerved; cauline leaves alternate, short-petiolate to sessile, linear to elliptic, ca. 2×0.5 cm. Capitula sessile, arranged in a stachyoid inflorescence; involucre 5- to 7-seriate, cylindrical, $12\text{--}14.5 \times 3\text{--}4$ mm; phyllaries papyraceous, purple, glabrous; outer phyllaries linear to ovate, acuminate, $2.8\text{--}3 \times 0.8\text{--}1$ mm; inner phyllaries linear to ovate or linear to elliptic, acuminate to acute, midvein dark, $11\text{--}13 \times 1.2\text{--}2$ mm. Florets 3, hermaphrodite, chasmogamous; corollas pink, lobes 3.5 mm (deeper slit ca. 5.5 mm), tube 4.5 mm; anthers ca. 6 mm, apical appendages apiculate, 1–1.5 mm, sagittate; tails ca. 1.3 mm, shortly pilose; style branches short-bilobate, rounded, ca. 0.25 mm. Achenes oblong, 3–4 mm, 10-nerved, densely pilose; pappus bristles ca. 39, 6–7 mm.

Distribution and phenology. China (Sichuan, Yunnan); collected at elevations between 2990 and 3640 m; flowering in October.

Relationships. This species is characterized by its apiculate anther appendages, rosulate leaves with winged petioles, and 3-flowered capitula. *Ainsliaea qianiana* exhibits some likeness to *A. macrocephala* in its habit and capitula. The latter species is amply distinguished by its rounded apical anther appendages and its pilose phyllaries and leaves. *Ainsliaea qianiana* also resembles *A. yunnanensis*, but *A. qianiana* may be distinguished by its apiculate apical anther appendages (vs. rounded) and its glabrous or subglabrous leaves (vs. strigose).

Observation of the type material. There are two other sheets from China, Yunnan. Colline de Kintchong-chan (*E. E. Maire* 2529 at NY and UC), which correspond to *Ainsliaea yunnanensis*.

Representative specimens examined. CHINA. **Sichuan:** In regionis temperate inter oppidum Yenyuen et flumen Yalung, *F. Handel-Mazzetti* 5383, Diar. No. 896 (W).

27. *Ainsliaea ramosa* Hemsl., J. Linn. Soc. Bot. 23: 471. 1888. TYPE: China. Hubei: Hupeh, “Nanto and mountains to the northward,” year 1885–1888, *A. Henry* 4422 (holotype, K not seen; isotype, US!). Figure 37.

Plants perennial, herbaceous, 0.30–0.55 m tall; stems erect, unbranched below the inflorescence, naked, with few leaves reduced or scattered leafy, strigose. Leaves basally clustered, rosulate, long-petiolate with petioles wingless, strigose, 4–8 cm; leaf blades subcoriaceous, ovate to oblong, $7.5\text{--}12.5 \times 3.5\text{--}6.5$ cm, acute to subobtuse at the apex, base deeply cordate, margins obscurely denticulate; upper surface sparsely strigose, and lower surface paler, red strigose, especially on the nerves (with long straight trichomes 1–1.5 mm); palmati-pinnate, 3- to 5-nerved. Capitula sessile or shortly pedunculate, arranged in thyrsoid inflorescence; involucre 5- or 6-seriate, cylindrical, ca. 10×7 mm broad; phyllaries papyraceous, purple, glabrous; outer phyllaries ovate, acute to acuminate, ca. 1.5×1 mm; inner phyllaries linear to elliptic, acute to acuminate, 3- to 5-nerved, ca. 10×0.9 mm. Florets 3, hermaphrodite, chasmogamous and cleistogamous (at different seasons); corollas white; *chasmogamous florets* with corollas ligulate, ca. 7 mm, lobes ca. 3 mm (deeper slit ca. 4 mm), tube ca. 3 mm; anthers ca. 4 mm, apical appendages apiculate, 0.5 mm, tails ca. 1.5 mm, smooth to slightly pilose; style branches short, rounded, ca. 0.4 mm. Achenes oblong, 1.5–2 mm, 10-nerved, densely pilose; pappus bristles 35



Figure 37. *Ainsliaea ramosa* Hemsl. —A. Habit. —B. Foliar trichome. —C. Phyllaries. —D. Capitulum. —E–H. Cleistogamous floret: E, stamen; F, style branches; G, corolla; H, achene with pappus. —I. Chasmogamous floret. Scale bars: A = 3 cm; B = 0.1 mm; C = 2 mm; D, I = 5 mm; E = 0.8 mm; F = 1 mm; G = 2 mm; H = 1.5 mm. Drawn from A–H, Wang 10279 (MO); I, Tsang 20084 (US).

to 37, ca. 5 mm; *cleistogamous florets* with corollas tubulose to pseudoligulate, ca. 4.5 mm, 5-lobed (deeper slit ca. 0.3 mm); anthers ca. 3 mm; style branches ca. 0.4 mm. Achenes ca. 2.5 mm, pappus bristles ca. 6 mm.

Distribution and phenology. Central and southern China (Guangdong, Guangxi, Hubei); collected on rocky hills; flowering in April and October, fruiting in January.

Relationships. *Ainsliaea ramosa* most resembles the species complex with *A. caveleriei*, *A. fragrans*, and *A. rubrinervis*. This complex and *A. ramosa* share leaves ovate to oblong, deeply cordate at the base, with villous petioles. However, *A. ramosa* may be differentiated by its apical anther appendages that are apiculate, and its phyllaries that are glabrous.

Representative specimens examined. CHINA. **Guangdong:** "Kwangtung," Naam Kwan Shan (Tsengshing District), W. T. Tsang 20084 (MO, NY, US, W). **Guangxi:** Xiangzhou Xian, C. Wang 40279 (MO); Xiangzhou Xian, C. Wang 40798 (MO).

28. *Ainsliaea reflexa* Merr., in Philipp. J. Sci. 1, suppl. 3: 242. 1906. TYPE: Philippines. Luzon: Lepanto, Mt. Data, 4 Nov. 1905, *E. D. Merrill* 4571 (holotype, NY!). Figure 38.

Ainsliaea longipetiolata Merr., Pap. Michigan Acad. Sci. 24: 91. 1939. Syn. nov. TYPE: Indonesia. Sumatra: E Coast, Karo Highlands, summit of Deleng Pintoe, 11 Jun. 1928, *C. Hamel & Rhamat Si Toroes* 615 (holotype, NY!; isotype, MICH not seen).

Ainsliaea reflexa var. *lobbiana* Beauverd, Bull. Soc. Bot. Genève, Sér. 2, 2: 37. 1910. Syn. nov. TYPE: Philippines, s.d., *Th. Lobb* 447 (holotype, K not seen; isotypes, W!, K photo LP!).

Ainsliaea tonkinensis Merr., Univ. Calif. Publ. Bot. 13: 142. 1926. Syn. nov. TYPE: Vietnam. Tonkin: Chapa, April 1925, *A. Pételot* 1767 (holotype, UC!).

Plants perennial, herbaceous, 0.10–0.60 m tall; stems erect, unbranched, with few leaves much reduced, loosely strigose. Leaves basally clustered, rosulate, long-petiolate; petioles flat, winged on upper half to practically wingless, sparsely strigose, scattered to much exceeding the lamina, 3–9 cm; leaf blades membranous, ovate or oblong to elliptic, 2–7 × 1.2–4 cm, acute at the apex, abruptly contracted and cuneate at the base, margins slightly wavy, with distant, short-spinulose teeth on each side of the midrib; deep green and subglabrous above, paler below and sparsely strigose, with veins somewhat more densely pubescent than the rest of abaxial surface, with few long straight trichomes, 1–2.5 mm; palmati-pinnate, 3-nerved. Capitula sessile or short-pedunculate, arranged in a stachyoid inflorescence;

peduncles 2–3 mm long; involucre 5- or 6-seriate, cylindrical to obdeltate, 6–12 × 2–5 mm; phyllaries papyraceous, glabrous to sparsely strigose above; outer phyllaries ovate, acute, 1.5–2 × 0.7–0.8 mm; inner phyllaries linear to lanceolate, acute, midvein dark, 7–12 × 1–1.3 mm. Florets 3, hermaphrodite, chasmogamous (with or more commonly without pappus) and cleistogamous (in single plant or at different season); corollas white or pale pink; *chasmogamous florets* with corolla ligulate, 5.5–6.5 mm, lobes 2–2.5 mm (deeper slit 2.7–3.5 mm), tube 2.7–3 mm; anthers 2.5–3 mm, apical appendages rounded, ca. 0.5 mm, sagittate; tails ca. 1 mm, shortly pilose; style branches short, truncate, 0.4–1 mm. Achenes oblong to elliptic, 1.5–2.5 mm, 10-nerved, pilose; pappus bristles 0(1, 2 or 8) or ca. 26, uniseriate, 4–4.5 mm; *cleistogamous florets* with corolla tubulose to pseudoligulate, 4-lobed, 2.2–3.5 mm, lobes ca. 0.2 mm (deeper slit ca. 0.4 mm); anthers ca. 1.2 mm; style branches ca. 0.5 mm. Achenes pilose, 3–5 mm; pappus bristles ca. 30, 4.5–7 mm.

Distribution and phenology. Southern China (Guangdong, Yunnan), Indonesia (Sumatra), Philippines, Taiwan, and southern Vietnam. It was collected in shaded mountain forest and in moist places along rivers and streams, or sunny grass fields, at elevations between 1800 and 3450 m (Fig. 7A); flowering and fruiting throughout the year.

Discussion. According to the protologue, *Ainsliaea tonkinensis* and *A. longipetiolata* were based on their long petiolate leaves (petioles 2–4 cm and 5–8 cm, respectively), with leaf blades oblanceolate and ovate to elliptic, respectively. After examining the type materials and subsequent collections, I considered these characters to be within the range of variation for *A. reflexa*.

Beauverd (1910) established the var. *lobbiana* because of its much smaller leaves, i.e., leaf blades 1–2 × 0.5–1.2 cm (vs. 2.5–6 × 1–2 cm in the protologue of *Ainsliaea reflexa*) and capitula sessile (vs. shortly pedunculate with peduncles of 2–3 mm in the protologue of *A. reflexa*). However, examination of the type material of var. *lobbiana* at W reveals that the smaller leaves are 2 × 1.2 cm. Because *A. reflexa* var. *lobbiana* does not appear to differ significantly from typical *A. reflexa*, I propose to place the var. *lobbiana* into synonymy of *A. reflexa*.

Vernacular name. Taiwan-haguma (Yamamoto, 1936).

Relationships. *Ainsliaea reflexa* is probably closely related to *A. latifolia* var. *taiwanensis*. Both taxa have leaves long-petiolate and achenes densely pilose. *Ainsliaea reflexa* is distinguished from *A. latifolia* var.



Figure 38. *Ainsliaea reflexa* Merr. A. Habit. B. Foliar trichome. C-F. Leaves from different specimens. —G. Phyllaries. —H. Style branches of chasmogamous floret. —I. Stamen of chasmogamous floret. —J. Chasmogamous floret epappose. —K. Chasmogamous floret pappose. —L. Stamen of cleistogamous floret. —M. Style branches of cleistogamous floret. —N. Cleistogamous floret. Scale bars: A = 3 cm; B = 0.1 mm; C–F = 3.5 cm; G = 2 mm; H, I = 1 mm; J, K = 2 mm; L, M = 1 mm; N = 2 mm. Drawn from A, B, G–N, *Ramos & Edaño 44917* (UC); C, the holotype *Hamel & Rhamat 615* (NY); D, the holotype *Merrill 4571* (NY); E, the isotype *Lobb 447* (W); F, *Suzuki 1450* (MO).

taiwanensis by its petioles that are only winged on the upper half to practically wingless (vs. petioles broadly winged). *Ainsliaea reflexa* also resembles *A. henryi* in its ovate or oblong leaf blades and winged on the upper half to practically wingless petioles, but *A. reflexa* differs from *A. henryi* by its achenes densely pilose (vs. glabrous or apically pilose).

Observations. Plants with flower stems few branched rather than single occur sporadically in northern Vietnam and Sumatra. A few examples of these plants are *A. Pételot* 2067 (NY, US), 3680 (C), and *O. Hagerup in 1916–1917* (C). These specimens resemble *Ainsliaea glumacea*, but they differ from it by their leaf bases contracted into the petiole (vs. uniformly narrowed).

The composition floret varies on a single plant from all cleistogamous, cleistogamous and chasmogamous, to all chasmogamous. This variation seems to coincide with the time of collection. In fact, according to the materials examined, i.e., between September and January, the florets are cleistogamous; from February to April, the plants have both florets, cleistogamous and chasmogamous (with or without pappus); and finally from May to July plants with chasmogamous florets (without pappus) are found. However, there is a period (February to April) in which the three possibilities can be found.

Representative specimens examined. CHINA. **Guangdong** (“**Kwangtung**”): Hainan, *Wang* 35545, 35546 (NY). **Yunnan**: Yangtze watershed, western slopes of Likiang Snow Range, *J. F. Rock* 4216 (US, W). INDONESIA. **Sumatra**: trail up volcano “Sinaboeng” [Sinabung], *W. N. & C. M. Bangham* 1191 (NY); Toba, *O. Hagerup in 1916–1917* (C); Gunung Leuser Nature Reserve Atjeh, North Sumatra Ketambe, Gunung, ca. 40 km NW of Kutatjane, 8–15 km SW from the mouth of Lau Ketambe, Camp 9, *W. J. J. O. de Wilde & B. E. E. de Wilde-Duyffes* 14245 (US), 10 km NE of Kampung Seldok (Alas Valley), ca. 25 km N of Kutatjane, *W. J. J. O. de Wilde & B. E. E. de Wilde-Duyffes* 15196 (MO, US); Gunung Leuser Nature Reserve, Atjeh, N Sumatra, Camp 4-5, Climbing Gunung Mamas, ca. 17 km SW from the mouth of Lau Ketambe, ca. 30 km NW of Kutatjane, *W. J. J. O. de Wilde & B. E. E. de Wilde-Duyffes* 16734 (MO); Mt. Leuser, Bivonsa No. 4, *S. Dillon Ripley & F. A. Ulmer* 43 (PH); Mt. Leuser, Bivonsa No. 7, *S. Dillon Ripley & F. A. Ulmer* 71 (PH); vicinity of Taloen na Oeli, Toba (E of Dolok Si Manock-manock, near headwaters of Aek Mandosi: topographic sheet 29, NW quarter), *Rahmat Si Boeea* 10132 (NY); residency of Tapianoeli, headwaters of Aek Mandosi, Toba (vicinity of Taloen na Oeli, near Toba-Asahan boundary: topographic sheet 29, W half, N of center), *Si Boeea Rahmat* 10451 (NY). PHILIPPINES. **Luzon**: Bontoc, Pauai, Benguet to Mt. Data, *M. S. Clemens* 16277 (UC); Benguet, *M. S. Clemens* 17256b (UC); Mt. Pulog, Benguet, *M. S. Clemens in 1925* (UC 268216); Mt. Data, Bontoc, *M. S. Clemens in 1928* (UC 374850), *M. S. Clemens* 18906 (UC); Benguet, Baguio, *A. D. E. Elmer* 8363 (MO, NY, PH, W); Benguet, Baguio, *A. D. E. Elmer* 14193 (C, MO, NY, US, W); Benguet, Baguio, *A. D. E. Elmer* 14293 (C, MO, NY, US, W); Mt. “Banajao,” *F. W. Foxworthy herb.* 2400 (US); Mt.

Banaho, *F. C. Gates et al.* 7262 (NY); Mt. Pulog, *M. Jacobs* 7081 (C, CANB, MO); Luzon central, Benguet, *A. Loher* 3621 (M); “Philippine Islands,” *A. Loher* 6474 (M); Rizal Prov., *A. Loher* 14045 (M, UC); Benguet, Mt. Sto. Tomas, *McClure* 16069 (UC); summit of Mt. Santo Tomas, *E. A. Mearns* 19, 20 (US); Laguna, Mt. Banajao, Mar. 1911, *E. D. Merrill* 734 (M, US); Benguet, *E. D. Merrill* 835 (M, US); Benguet, Mt. Tonglon, *E. D. Merrill* 4824 (NY); Benguet, Mt. Pauai, *E. Quisumbing & M. Sulit* 6240 herb. 82335 (NY); Bontoc, Mt. Polis, *M. Ramos & G. Edaña* 37614 (UC, US); Mt. Data, Lepanto, *M. Ramos & G. Edaña* 40191 (UC, US, W); Lepanto, Mt. Pangualaytacay, *M. Ramos & G. Edaña* 40469 (US); Benguet, Mt. Pulog, *M. Ramos & G. Edaña* 44917 (NY, UC); Benguet, Pauai, *J. K. Santos* 32047 (NY); Mountain Prov., Bontoc, Barrio Agawa, Besao, near summit of Mt. Mashit, *J. Vera Santos* 5436 (US); N Luzon, Benguet (Prov. Union), Mt. Santo Tomás, *R. S. Williams* 1434 (NY, US). TAIWAN. **Han**: Mt. Nan-liu, Co. Han, *C. C. Chuang & T. Kao* 2526, p.p. (AAU). **Kaohsiung**: Taoyuan Hsiang, Paoshan Village, rd. from Shelter to end of Chuyunshan Forest Rd., *H. L. Ho et al.* 879 (HAST, MO); Toayan Co., Palin to Tamanshan, *K. C. Yang* 1318 (NY). **Nantou**: Jenai Hsiang, en route from Yunhai to Tienchih, *H. L. Ho et al.* 611 (MO); Chitou to Chiti, *T. Koyama* 8643 (NY). **Pingtung**: Wutai Hsiang, en route from entrance to Payutzu, *C. H. Lin & H. F. Yen* 348 (US). **Unknown**: Mt. A-li, Co. Chiayi, *C. C. Chuang & M. T. Kao* 4198 (PH); Mt. Arisan, *R. Kanehira & S. Sasaki* 21644 (UC); Mt. Taipinshan, *H. Keng* K1214 (US); Arisan, *J. Linsley Gressitt* 195 (NY, S); Mt. Taiheizan, *S. Suzuki in 1929* (US); Mt. Taiheizan, *S. Suzuki* 1450 (MO); Mt. Kiraisyu-namp, *S. Suzuki* 2256 (US); Arisan, *S. Suzuki & Y. Kudo in 1928* (S); Mt. Chiagshui, Co. Hualien, *M. Teraya* 459, p.p. (CM). VIETNAM. **Kontum**: SW slopes of Ngoc Linh mountain system, *L. Averyamov et al.* VH 471 (AAU). **Tonkin**: Cha Pa, *A. Pételot* 2067 (NY, US); Cha Pa, *A. Pételot* 3680 (C, NY).

29. *Ainsliaea rubrinervis* C. C. Chang, *Sinensia* 4(8): 226. 1934. TYPE: China. Sichuan: Kwanhsien, 3000–3600 ft., 7 July 1928, *W. P. Fang* 2076 (holotype, N not seen; isotype, NY!). Figure 39.

Plants perennial, herbaceous, 0.15–0.60 m tall; stems erect, unbranched, naked, with few leaves reduced, strigose. Leaves basally clustered, rosulate, long-petiolate with petioles wingless, strigose, (1.5)6–7(11) cm; leaf blades subcoriaceous, ovate to oblong, (3)7–10.5 × (1.5)3–3.5 cm, acute at the apex, base deeply cordate, margins obscurely denticulate; upper surface sparsely strigose, lower surface whitish green, and red-strigose with long straight trichomes ca. 1.5 mm; palmate-pinnate, 3- to 5-nerved, veins prominent and red on lower surface. Capitula sessile or short-pedunculate, arranged in stachyoid inflorescence; involucre 5- or 6-seriate, cylindrical, 8–10 × ca. 4 mm; phyllaries papyraceous, glabrous; outer phyllaries ovate, acute, 2–3 × 1–1.5 mm; inner phyllaries linear to elliptic, acuminate, 3-nerved, 8–9 × ca. 2 mm. Florets 3, hermaphrodite, chasmogamous; corollas white, ligulate, ca. 10 mm, lobes ca. 3.5–4 mm (deep slit ca. 6 mm), tube ca. 4 mm;



Figure 39. *Ainsliaea rubrinervis* C. C. Chang. —A. Habit. —B. Capitulum. —C. Phyllaries. —D. Foliar trichome. —E. Style branches. —F. Stamen. —G. Chasmogamous floret. Scale bars: A = 3 cm; B = 5 mm; C = 2 mm; D = 0.1 mm; E, F = 0.1 mm; G = 2 mm. Drawn from the isotype Fang 2076 (NY).

anthers purple, ca. 5 mm, apical appendages apiculate, ca. 1 mm, sagittate, tails 1–1.5 mm, shortly pilose; style branches short, rounded, 0.5 mm. Achenes oblong-elliptic, 2–3.5 mm, 10-nerved, densely pilose; pappus bristles ca. 39, 7–7.5 mm.

Distribution and phenology. *Ainsliaea rubrinervis* at present is only known from the type collection from central China (Sichuan) in woods, between 900 and 920 m; flowering in July.

Relationships. *Ainsliaea rubrinervis* most resembles the species complex constituted by *A. cavaleriei*, *A. ramosa*, and *A. fragrans*. This complex and *A. rubrinervis* share leaves that are ovate to oblong, deeply cordate at the base, with villose petioles. *Ainsliaea rubrinervis* may be distinguished by its apical anther appendages apiculate, phyllaries glabrous, and its leaf veins violet beneath.

30. *Ainsliaea smithii* Mattf., Acta Horti Gothob. 8: 79. 1933. TYPE: China. Sichuan: Sze-chuan, Drogochi, 3400 m, 26 Sep. 1922, *H. Smith* 4698 (type fragm., W!). Figure 40.

Plants perennial? (rhizome unknown), herbaceous, ca. 0.40 m tall; stems erect, leafy, unbranched below the inflorescence, lanuginose. Leaves basally clustered? (rosette unknown), long-petiolate with petioles broadly winged, slightly narrowed to the base, 8.5–11 × 1.2 (at the upper point) cm; leaf blades chartaceous, ovate to ovate-deltoid, 10–12 × 8–9.5 cm, apex acute to acuminate, cordate at the base, margins obscurely denticulate; sparsely lanate on both surfaces with short glandular biseriate trichomes, and long crisped trichomes; palmati-pinnate, 3- to 5-nerved; cauline leaves alternate, short-petiolate, ovate, gradually reduced upward becoming linear to lanceolate, (1)4(7.5) × (0.2)1(3) cm. Capitula short-pedunculate, arranged in thyrsoïd inflorescence; involucre 5- or 6-seriate, cylindrical, 10–12 × 2.5–3 mm; phyllaries papyraceous; outer phyllaries ovate, acuminate, ca. 3 × 1 mm, glabrous; inner phyllaries linear to elliptic, acute to acuminate, midvein dark, ca. 11 × 0.7 mm, dorsally with short glandular trichomes. Florets 3, hermaphrodite, cleistogamous; corolla tubulose to pseudoligulate, ca. 6 mm, lobes ca. 0.8 mm (deeper slit ca. 1.2 mm); anthers ca. 1.9 mm, apical appendages rounded, ca. 0.4 mm, sagittate; tails ca. 0.7 mm, smooth to slightly pilose; style branches short, rounded, ca. 0.3 mm. Achenes oblong-obovate, ca. 2.5 mm, 10-nerved, densely pilose; pappus bristles ca. 32, ca. 8 mm.

Distribution and phenology. At present *Ainsliaea smithii* is only known from the type collection, China (Sichuan); flowering in September.

Discussion. No other material was mentioned by Mattfeld, and I was unable to find another collection in order to select a neotype.

Relationships. *Ainsliaea smithii* is closely related to *A. bonatii*. Both species have leaves with winged petioles and cordate leaf blades. They differ only in its phyllaries, i.e., dorsally glandular and acuminate at the apex in *A. smithii* vs. apically strigose and acute at the apex in *A. bonatii*.

31. *Ainsliaea spanocephala* Y. C. Tseng, Acta Phytotax. Sin. 26: 74. 1988. TYPE: Thailand. Loei: Phu Luang, Phu Ruea, Wildlife Sanc. Stat., 1450 m, 19 Feb. 1983, *H. Koyama*, *H. Terao* & *W. Thawatchai* 33699 (holotype, KUN not seen; isotypes, BKF!, GH!, KYO!). Figure 41.

Plants perennial, herbaceous, 0.45–0.90 m tall; stems erect, unbranched below the inflorescence, naked and glandulose-strigose. Leaves basally clustered, rosulate, long-petiolate; petioles wingless, conspicuously villose, (2)5–12 cm; leaf blades subcoriaceous, elliptic or ovate to elliptic, 5–14 × 2–5.5 cm, acute to obtuse at the apex, base rounded, margins obscurely denticulate and pilose, upper surface sparsely strigose, lower surface strigose, with long 3-seriate straight trichomes; palmati-pinnate, 3-nerved. Capitula long-pedunculate, arranged in thyrsoïd inflorescences; involucre 4- or 5-seriate, cylindrical, 12–14 × 5–6 mm; phyllaries papyraceous, dorsally with glandular trichomes; outer phyllaries ovate, acute, 2–3 × 0.8–1.5 mm; inner phyllaries linear to lanceolate, acute, 3-nerved, 11–14 × 1.5–3 mm. Florets 5, hermaphrodite, chasmogamous; corollas white, ligulate, 12–16 mm, lobes 5–8 mm (deeper slit 8–10.5 mm), tube 4–5.5 mm; anthers purple, 7–8 mm, apical appendages apiculate, ca. 1 mm, sagittate; tails 1.2–2 mm, shortly pilose; style branches short, truncate, ca. 0.5 mm. Achenes oblong, attenuate at the base, 2–4.5 mm, 10-nerved, densely red-pilose; pappus bristles ca. 36, 9–11 mm.

Distribution and phenology. It was collected in evergreen forest of central Thailand (Loei), commonly in shady spots along streams in lower mountains, at elevations between 1150 and 1530 m (Fig. 3B); flowering from December to February.

Discussion. *Ainsliaea brandisiana* sensu Koyama (in Acta Phytotax. Geobot. 32(1-4): 60, fig. 2, 1981) corresponds to *A. spanocephala* because the materials mentioned by Koyama for *A. brandisiana* (“Henipman 3608” and “Bunchuai 1501”) have leaves that are rounded at the base.

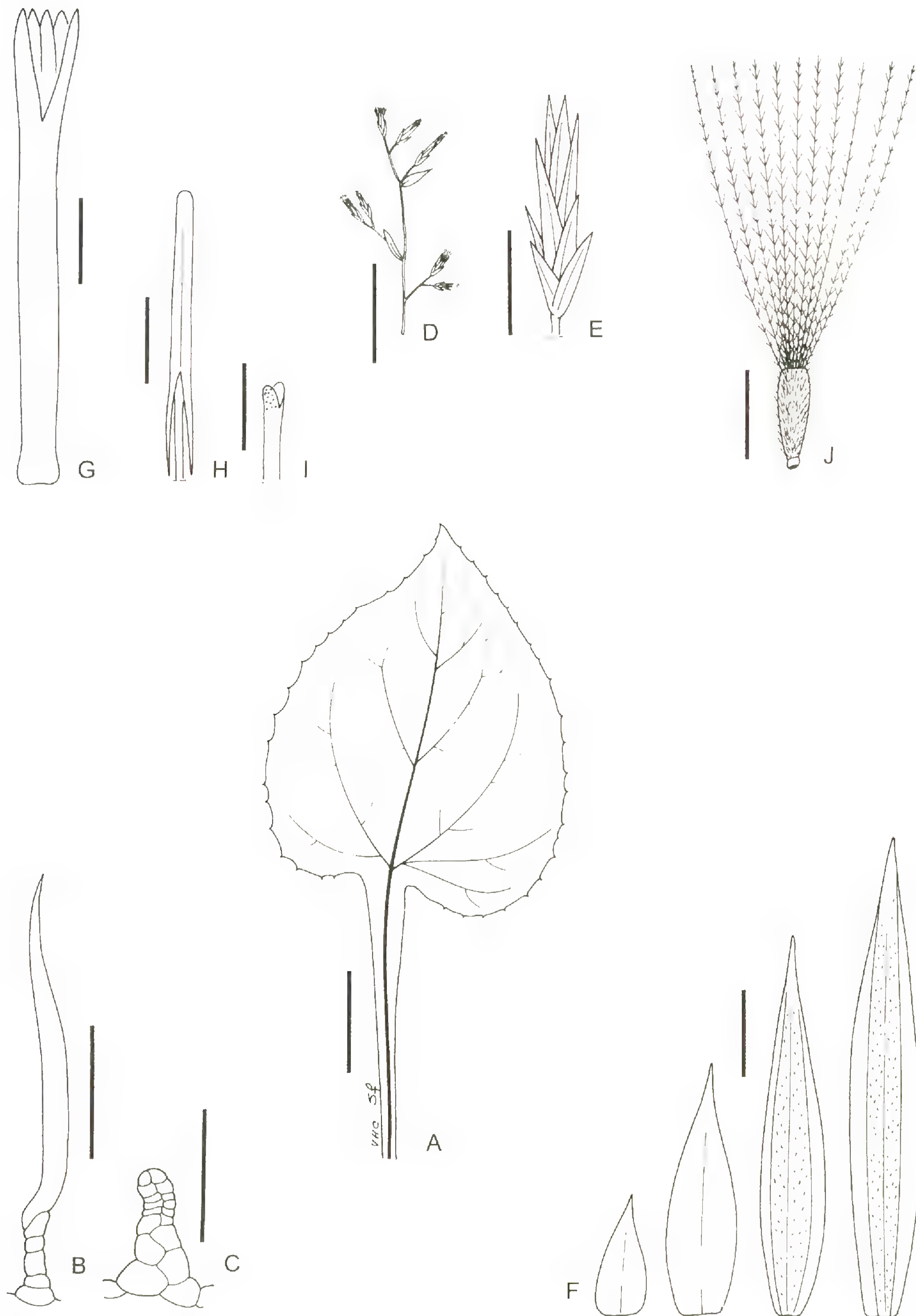


Figure 40. *Ainsliaea smithii* Mattf. —A. Basal leaf. —B, C. Leaf trichomes. —D. Fragment of the inflorescence. —E. Capitulum. —F. Phyllaries. —G–J. Cleistogamous floret: G, corolla; H, stamen; I, style branches; J, achene with pappus. Scale bars: A, D = 3 cm; B, C = 0.1 mm; E = 5 mm; F, J = 2 mm; G = 1 mm; H, I = 0.5 mm. Drawn from the type *Smith 4698* (W).



Figure 41. *Ainsliaea spanocephala* Y. C. Tseng. —A. Habit. —B. Capitulum. —C. Glandular trichome of phyllaries. —D. Foliar trichome. —E. Chasmogamous floret. —F. Stamen. —G. Style branches. Scale bars: A = 3 cm; B = 5 mm; C = 0.05 mm; D = 0.15 mm; E = 5 mm; F = 2 mm; G = 1 mm. Drawn from A, the paratype *Hennipman 3608* (C); B, E–G, the paratype *Hennipman 3608* (BKF); C, D, *Niyomdham & Vidal 438* (C).

Relationships. *Ainsliaea spanocephala* is closely related to *A. brandisiana* Kurz. Both species have capitula with five florets and similar 3-seriate foliar trichomes. They are different only in the leaf base, rounded and cordate, respectively.

Representative specimens examined. THAILAND. **Loei:** Phu Luang, *K. Bunchuai* 1501 (BKF); Phu Luang, Phu Ruea, Wildlife Sanc. Stat., *E. Hennipman* 3608 (paratypes BKF, C, KYO); Phu Luang, Phu Ruea distr., Wildlife Sanctuary, *H. Koyama et al.* T-31605, T-31642 (BKF, KYO); Phu Luang, *C. Niyomdham & E. Vidal* 438 (AAU, BKF, C); Phu Luang, Wildlife Sanctuary, *T. Smitinand in 1982* (BKF 077323).

32. *Ainsliaea spicata* Vaniot, Bull. Acad. Int. Géog. Bot. 12: 117. 1903. TYPE: China. Yunnan: "Environs de Yun-nan-sen," 28 Jan. 1897, *F. Ducloux* 9D (holotype, E!; isotype, W!). Figure 42.

Ainsliaea pteropoda var. *obovata* Franch., J. Bot. (Desvaux) 2: 69. 1888. *Ainsliaea latifolia* var. *obovata* (Franch.) Grierson & Lauener, Notes Roy. Bot. Gard. Edinburgh 34: 385. 1976. TYPE: China. Yunnan: "Les bois de Mo che tchin au-dessus de Tapin-tze," 1800 m, 15 Jan. 1886, *J. M. Delavay* 1921A (type, P!).

Plants perennial, herbaceous, 0.18–0.60 m tall; stems erect, unbranched, naked, with few leaves reduced or more rarely leafy, lanuginose. Leaves basally clustered, rosulate, subsessile or shortly petiolate with petioles wingless, 4–7(10) mm; leaf blades chartaceous to slightly fleshy, obovate or obovate to pandurate, 5–13 × 2.5–5 cm, obtuse to subobtuse at the apex, base rounded abruptly narrowed onto the petiole, margins obscurely denticulate; upper surface sparsely strigose and lower surface strigose-lanate (with two types of trichomes, long crisped and long straight) or strigose (with long straight trichomes only); palmate-pinnate, 3-nerved; cauline leaves alternate, short-petiolate to sessile, ovate or ovate to pandurate. Capitula sessile or short-pedunculate, arranged in a stachyoid inflorescence; involucre 5- or 6-seriate, cylindrical, 8–12 × ca. 4 mm; phyllaries papyraceous, purple; outer phyllaries ovate, acute, ca. 3 × 1.3 mm, glabrous; inner phyllaries linear to elliptic, acute, midvein dark, ca. 12 × 1.4 mm, glabrous or short-pilose above. Florets 3, hermaphrodite, chasmogamous and cleistogamous (at different seasons or in single plant); corollas pink or white to pink; *chasmogamous florets* with corollas ligulate, 13–13.5 mm, lobes 6–6.5 mm (deeper slit ca. 7.5 mm), tube 5.5–6 mm; anthers ca. 5.5 mm, apical appendages rounded, ca. 1 mm, sagittate; tails 1.5–1.8 mm, shortly pilose; style branches short, truncate, ca. 0.2 mm. Achenes oblong, 2–3 mm, 10-nerved, densely pilose; pappus bristles 30 to 40, ca. 7 mm (sometimes absent); *cleistogamous florets* with corollas tubulose to pseudoligulate, 4–4.5 mm, 4-lobed (dee-

per slit ca. 0.3 mm); anthers ca. 1.5 mm; style branches 0.7–0.8 mm. Achenes 4–5 mm; pappus bristles 7–8 mm.

Distribution and phenology. Dry pebbly ground in light shade on sandy soils, between 1050 and 3700 m, from Bangladesh, Bhutan, China (Guizhou, Sichuan, Yunnan), India, and Thailand (Fig. 7B); collected in flower from January to March, in May, and from October to December.

Relationships. *Ainsliaea spicata* most resembles *A. latifolia*. Both have leaves basally clustered but may be differentiated by their leaves. *Ainsliaea latifolia* has ovate leaves, with long winged petioles, whereas *A. spicata* has obovate or obovate to pandurate leaves, subsessile or with short wingless petioles.

Representative specimens examined. BANGLADESH. "East Bengal," *Griffit* 3331 (C, M). BHUTAN. No further data, s. coll. (W7212). CHINA. **Guizhou:** "Kouy-Tchéou" [Kwetschou], environs de "Kouy-Yang" [Guiyang, Kweyang], *R. P. Bodinier* 1584 (NY). **Sichuan:** Huili, *F. Handel-Mazzetti* 864, Diar. Nr. 213 (W). **Yunnan:** "Yünnanfu" [Kun-ming], *J. Cavalerie* 21 (S, W); Yünnanfu, ad templum Schili-ngan, *F. Handel-Mazzetti* 293 Diar. Nr. 56 (W); in montis Taohwa-schan prope oppidum Beyendjing medium inter "Tschuhsiung" [Tsuyung] et Yungbei, Tschischingai, *F. Handel-Mazzetti* 6255, Diar. Nr. 1111 (W); "Mengtse" [Mengzi], s.d., *A. Henry* 9294 (MO), 9294A (NY) 9294B (NY); "Szemao" [Simao], *A. Henry* 12763A (NY); "Jingdong" [Jinghong] Co., Mt. Tamati-houshan, *M. K. Li* 0724 (HITBC); Tong-tchouan, *E. E. Maire* 3225 (NY, UC, US, W); Tong-chuan, Mar., *E. E. Maire* s.n. (W7135); NE-Yunnan, s.d., *E. E. Maire* s.n. (W7228); Jingdong Co., Xujiaba, 7 May 1981, s. coll. (HITBC 071883). **Unknown:** "Plants of E Tibet and SW China, Yengyueh," *G. Forrest* 7865 (S). INDIA. **Assam:** Shillong, *C. B. Clarke* 37392 (US); Khasia, *J. D. Hooker & T. Thomson* s.n. (NY, S, W1257); on way to Shillong, *S. L. Kapoort* 75623 (MO). **Manipur:** Manipur, Uku Nagaberge, *A. Meebold* 6805 (W). THAILAND. **Chiang Mai:** Payap, Chiangrai, en route from Ban Lang Lat to middle elevation of Doi Pacho (Doi Langka), *F. Iwatsuki et N. Fukuoka* T3558 (AAU, BKF). **Udawn:** Loey, Phu Luang, *M. Tagawa et al.* 1611 (BKF).

33. *Ainsliaea yunnanensis* Franch., J. Bot. (Morot) 2: 70. 1888. *Ainsliaea latifolia* (D. Don) Sch. Bip. f. *yunnanensis* (Franch.) Kitam., Acta Phytotax. Geobot. 41: 171. 1990. *Ainsliaea pteropoda* DC. var. *leiophylla* Franch., J. Bot. (Morot) 2: 69. 1888. TYPE: China. Yunnan: Che-tcho-tze, "supra Tapin-tze," 3 Oct. 1882, *J. M. Delavay* 608 (type, NY!). Figure 43.

Ainsliaea scabrida Dunn, J. Linn. Soc., Bot. 35: 510. 1903. TYPE: China. Yunnan: Mi lê, in woods at Mengtze, *A. Henry* 9851 (lectotype, designated here, MO!; duplicates, K not seen, K photo LP!).

Plants perennial, herbaceous, 0.25–0.70 m tall; stems erect, unbranched, leafy, lanuginose. Leaves basally clustered, rosulate, long-petiolate, petioles



Figure 42. *Ainsliaea spicata* Vaniot. —A. Habit. —B, C. Foliar trichomes. —D. Leaves: cauline leaf and basal leaves (from left to right). —E. Leaves: cauline leaf and basal leaves (from left to right). —F. Basal leaf. —G. Capitulum. —H, K, L. Chasmogamous floret: H, corolla; K, stamen; L, style branches. —I, J. Cleistogamous floret: I, corolla; J, achene with pappus. Scale bars: A, D–F = 3 cm; B, C = 0.1 mm; G, H, J = 5 mm; I, K = 2 mm; L = 1 mm. Drawn from A, G–L, *Maire s.n.* (W7228); B, C, *Delavay 1921A* (P); D, *Henry 9294A* (NY); E, *Kapoort 75623* (MO); F, *Handel-Mazzetti 864* (W).

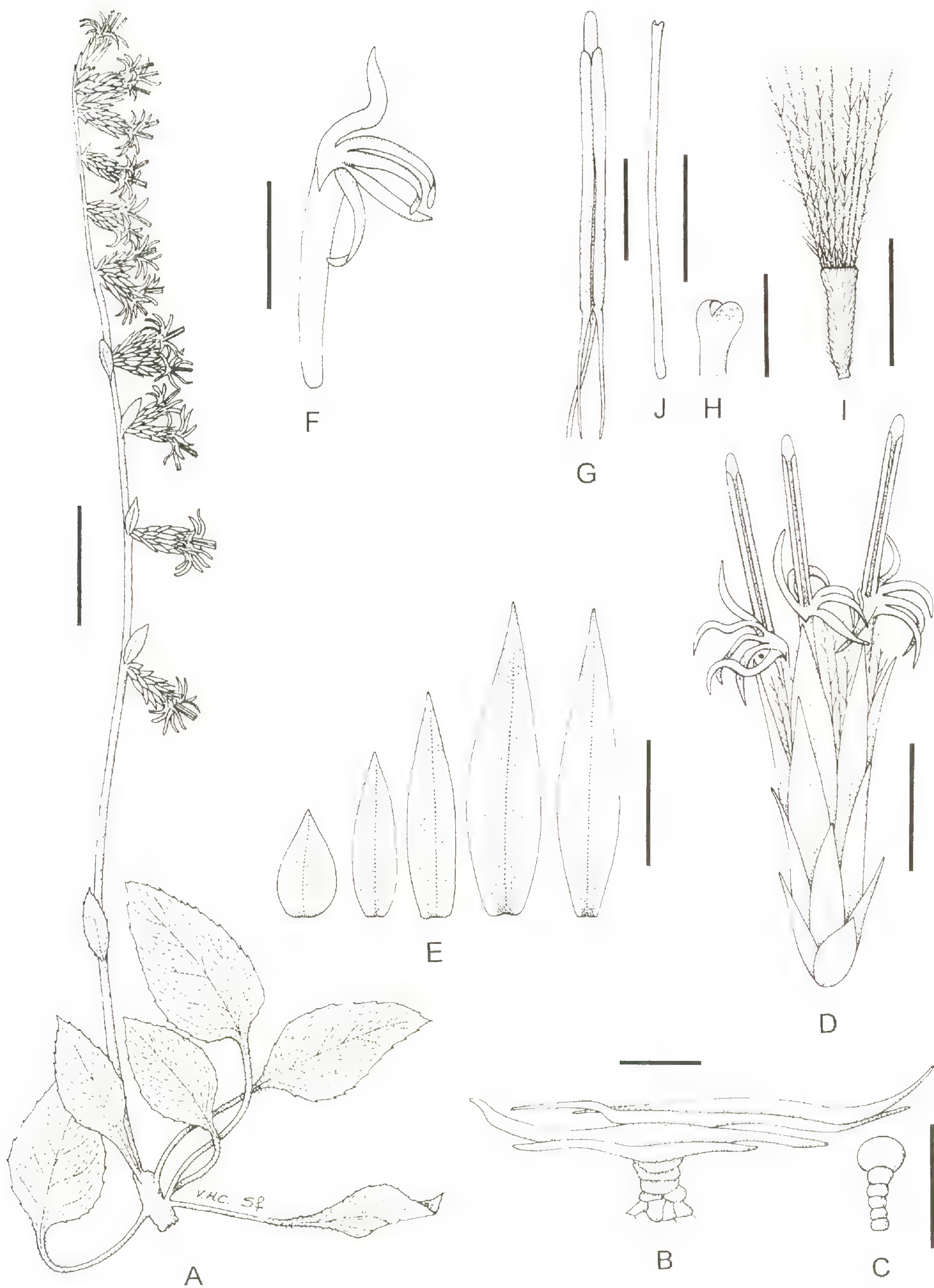


Figure 43. *Ainsliaea yunnanensis* Franch. —A. Habit. —B, C. Foliar trichomes. —D. Capitulum. —E. Phyllaries. —F–J. Chasmogamous floret; F, corolla; G, stamen; H, style branches; I, achene with pappus; J, style. Scale bars: A = 3 cm; B = 0.1 mm; C = 0.02 mm; D–F, I, J = 5 mm; G = 2 mm; H = 1 mm. Drawn from A, D–J, *Cavalerie* 22 (S); B, C, the type *Delavay* 608 (NY).

wingless, 2.5–4.5 cm; leaf blades coriaceous, ovate, 2.5–5.5 × 1.2–3 cm, acute at the apex, abruptly contracted at the base, then cuneately narrowed into the petiole, margins denticulate; roughly strigose on both surfaces, with long T-shaped trichomes and few glandular trichomes uniseriate; palmati-pinnate, 3-nerved. Capitula sessile, arranged in a stachyoid inflorescence; involucre 5-seriate, cylindrical, 13–15 × 3–7 mm; phyllaries subcoriaceous, purple apically, glabrous; outer phyllaries ovate, acute, ca. 6 × 2.5 mm; inner phyllaries lanceolate, acute, midvein dark, ca. 11 × 2.5 mm. Florets 3, hermaphrodite, chasmogamous; corolla pink, ligulate 14–15 mm, lobes 5–7 mm (deeper slit 7–8 mm), tube 7–7.5 mm; anthers 8–9 mm, apical appendage rounded, ca. 1 mm, sagittate; tails ca. 2.5 mm, smooth to slightly pilose; style branches shortly bilobate, truncate, ca. 0.3 mm. Achenes slightly oblong to obovate, 3–4 mm, 10-nerved, densely pilose; pappus bristles 32 to 37, ca. 7.5 mm.

Distribution and phenology. Southern China (Yunnan), collected on mountain slopes at elevations between 1600 and 3640 m; flowering in March, May, September, October, and December.

Discussion. Two syntypes from Yunnan are mentioned in the protologue of *Ainsliaea scabrida*: “mountain slopes at 6000 ft. near Mengtze, *Hancock* 8” and “in woods at Mengtze, *A. Henry* 9851.” I selected as lectotype the collection “*A. Henry* 9851” kept at MO, which is better preserved.

Relationships. *Ainsliaea yunnanensis* resembles *A. parvifolia* in its leaves. Both species have long-petiolate leaves, with leaf blades that are coriaceous or subcoriaceous and cuneate at the base. *Ainsliaea yunnanensis* may be distinguished by its foliar T-shaped trichomes (vs. straight trichomes), achenes pilose (vs. pilose above), and its larger involucre, 13–15 mm (vs. 8–10 mm).

Key to the species of *Ainsliaea* section *Aggregatae* in Asia

- 1a. Leaf blades linear to elliptic or elliptic (0.3–0.9 cm wide).
 - 2a. Blades linear to elliptic, apex acute, 1-nerved.
 - 3a. Leaf margins with 4 to 8 teeth on each side 9. *A. linearis*
 - 3b. Leaf margins with 1 or 2 subterminal teeth on each side 14. *A. walkeri*
 - 2b. Blades lanceolate, 5–13 mm wide, apex acuminate, 3-nerved 13. *A. trinervis*
- 1b. Leaf blades lobed, parted, or entire (more than 0.9 cm wide).
 - 4a. Anther appendages apiculate.
 - 5a. Leaves deeply 3-parted 5. *A. dissecta*
 - 5b. Leaves lobed, but not 3-parted, with more than 3 lobes.
 - 6a. Blades palmately lobed, slightly cordate at the base 1. *A. acerifolia*
 - 6b. Blades pinnately lobed, sagittate at the base 4. *A. cordifolia*
 - 4b. Anther appendages rounded.
 - 7a. Leaves lobed.
 - 8a. Blades palmately lobed 2. *A. apiculata*
 - 8b. Blades shallowly pinnately lobed 7. *A. grossedentata*
 - 7b. Leaves not lobed.
 - 9a. Blades lanceolate, attenuate at the base 11. *A. oblonga*

Representative specimens examined. CHINA. **Yunnan:** Yunnan Sen, *M. M. Bodinier & F. Ducloux* 8 (MO); Kunming, *P. I. Chiou* 60097 (CM); Yünnanfu, *J. Cavalerie* 22 (S), Yunnan, *J. M. Delavay in 1895* (UC, W); mountain slopes near Mengtze, *W. Hancock* 8 (paratype of *A. scabrida*, K photo LP); Yunnan Sen, *E. E. Maire* 919 (C, UC, W); Yunnan Kin-tchongchan, *E. E. Maire* 2529 (NY, UC); Yunnan, *E. E. Maire* 3947 (UC); Kin-tchoug-chan, *E. E. Maire s.n.* (W7224); W of Talifu, Mekong watershed, rd. to “Youngechang” [Shuangjiang] and Tengyueh, Mt. above Hoa Chao, *J. F. Rock* 6937 (US); “Berg über Podjo w.v. Tunghai,” *H. v. Wissmann* 184 (W); “Zw. Oschan & Podjo w.v. Tunghai,” *H. v. Wissmann* 230 (W); Molangpo bei “Yuendjiang” [Shuangjiang], *H. v. Wissmann* 411 (W). **Unknown:** Hu-Chan-men, *J. M. Delavay in Oct. 1889* (US, W); s. loc., *K. Hou* 74236 (MO).

C. AINSLIAEA SECT. AGGREGATAE BEAUVERD

Ainsliaea sect. **Aggregatae** Beauverd, Bull. Soc. Bot. Genève, Sér. 2, 1: 376. 1909. TYPE: *Ainsliaea acerifolia* Sch. Bip., lectotype, designated here.

Ainsliaea sect. *Aggregatae* was circumscribed by Beauverd (1909: 376) as containing 14 species (see Taxonomic History), no species name being designated by Beauverd as the type. *Ainsliaea acerifolia*, which is in accordance with the protologue, is here designated as lectotype of *Ainsliaea* sect. *Aggregatae* Beauverd.

Perennial herbs; stems erect, unbranched. Leaves clustered near the median part of the stem (rarely rosulate). Florets usually 3, rarely 2; anthers with apical appendages truncate or rounded, sometimes apiculate or emarginate, and tails usually shortly pilose, sometimes smooth to slightly pilose or shortly pilose.

Fourteen species from eastern China (Anhui, Fujian, Guangdong, Guangxi, Guizhou, Hubei, Hunan, rarely Sichuan and Yunnan, and Zhejiang), Korea, Taiwan, and Japan.

- 9b. Blades ovate, rounded or cordate at the base.
 - 10a. Blades 2–3.5(7) cm long.
 - 11a. Blades chartaceous, usually purplish green on lower surface 6. *A. gracilis*
 - 11b. Blades subcoriaceous, green on lower surface 12. *A. parvifolia*
 - 10b. Blades usually more than 4 cm long.
 - 12a. Achenes glabrous or pilose above 8. *A. kawakamii*
 - 12b. Achenes pilose.
 - 13a. Blades white-lanate on lower surface (with long crisped trichomes)
. 3. *A. apteroides*
 - 13b. Blades green on lower surface (with long straight trichomes)
. 10. *A. macroclinidioides*

1. *Ainsliaea acerifolia* Sch. Bip., Jahresber. Pollichia 18–19: 188. 1861. TYPE: Japan. *H. Burger* & *H. Zollinger* 272 (holotype, P!). Figure 44.

Plants perennial, herbaceous, 0.25–0.80 m tall; stems erect, unbranched, loosely strigose. Leaves 4 to 7, clustered near the middle of stems, falsely verticillate, long-petiolate; petioles wingless, flat, slightly shorter than the blades, slightly strigose; leaf blades chartaceous, cordate at the base, palmatilobed, lobes acuminate, mucronate-toothed, with terminal segments 2- or 3-dentate-lobed; dark green above and pallid below; subglabrous on both surfaces, veins somewhat more densely pubescent, with long straight trichomes, 0.6–1.5 mm long; palmativeined. Capitula subsessile, arranged in a stachyoid inflorescence; peduncles 1–2 mm, with many minute bracts and the upper transitioning to involucre bracts, involucre 7- or 8-seriate, cylindrical, 11–15 × 4–5 mm; phyllaries subcoriaceous, glabrous, or apically slightly strigose; outer phyllaries very short, ovate, the apices obtuse, 1.5–2 × 1–1.5 mm; inner phyllaries oblong, the apices subobtuse, 3- to 5-nerved, 10–11 × ca. 2 mm. Florets 3, hermaphrodite, chasmogamous, corollas white, ligulate, ca. 15 mm, lobes ca. 8 mm (deeper slit ca. 9 mm long), tube ca. 6 mm; anthers 7–7.5 mm, apical appendages apiculate, 0.4–0.5 mm, sagittate; tails 1.7–2 mm, shortly pilose; style branches short-lobed, rounded, ca. 0.7 mm. Achenes oblong, usually flattened, 3.5–8 mm, 10-nerved, glabrous; pappus bristles 36 to 50, 8–10 mm.

Distribution. Japan (Honshu) and South Korea; variety *subapoda* also extends to Liaoning, China (Fig. A).

Relationships. *Ainsliaea acerifolia* most resembles *A. lancangensis*. Both have leaves arranged at the median part of the stem, with blades palmately lobed and apiculate anther appendages. *Ainsliaea acerifolia* differs from *A. lancangensis* by its 3-flowered capitula. In contrast, the capitula of *A. lancangensis* are 1-flowered.

Key to varieties of Ainsliaea acerifolia in Japan and South Korea

- 1a. Leaf blades deeply 7- to 9(11)-lobed . . . 1a. var. *acerifolia*
- 1b. Leaf blades shallowly 5- to 7-lobed . . . 1b. var. *subapoda*

1a. *Ainsliaea acerifolia* Sch. Bip. var. ***acerifolia***. Figure 44A–F.

Leaves deeply 7 to 9(11)-lobed, base cordate, blades 10–13 × 10–15 cm, petiole 6–9 cm; 7- to 9(11)-nerved.

Distribution and phenology. Japan (Kyushu), woods in mountains; flowering collection without month (Fig. 3A)

Vernacular names. Momiji-haguma (Kitamura, 1965), Momidzi-haguma (Iinuma, 1862; Masamune, 1934).

Representative specimens examined. JAPAN. **Locality unknown:** Ex Herb. Lugd. Batav., s. coll. (S, W). Kyushu. “In montib. Kund-sho-jan” [Kundjhojan], *C. J. Maximowicz in 1863* (M, MO, S, US, W).

1b. *Ainsliaea acerifolia* Sch. Bip. var. ***subapoda*** Nakai, Bot. Mag. (Tokyo) 30: 290. 1916. TYPE: Korea. Phying-an bor.: Nyag-suidong, s.d., *T. Ishidoya s.n.* (holotype, TI not seen; isotype, TI photo LP!). Figure 44G, H.

Leaves shallowly 5- to 7-lobed with broad lobes, cordate to subcordate at the base, blades 5–14 × 5.5–18 cm, petiole 4–12 cm; 5- to 7-nerved.

Distribution and phenology. China (Liaoning), South Korea, and Japan (Honshu). Commonly collected on humus slopes in *Abies* Mill., *Quercus* L., or *Chamaecyparis* Spach-*Cryptomeria* D. Don forest at elevations between (70/200)500 and 2500 m; flowering from August to October.

Discussion. Miquel (1866: 187) published his *Ainsliaea affinis* on “*Keiske lectum*.” Kitamura (1938) considered *A. affinis* Miq. as a variety of *A. acerifolia* and made the new combination *A. acerifolia* var. *affinis* (Miq.) Kitam. Even if I were able to find the type collection of *A. affinis* (“*Keiske lectum*”) in G, L, or U, where the original herbarium of Miquel is probably deposited, the protologue of *A. affinis* agrees in all respects with *A. acerifolia* var. *subapoda*.

Vernacular names. Oku-Momiji-haguma (Kitamura, 1965; *Furuse in 1958, in 1961*, S), Momiji-

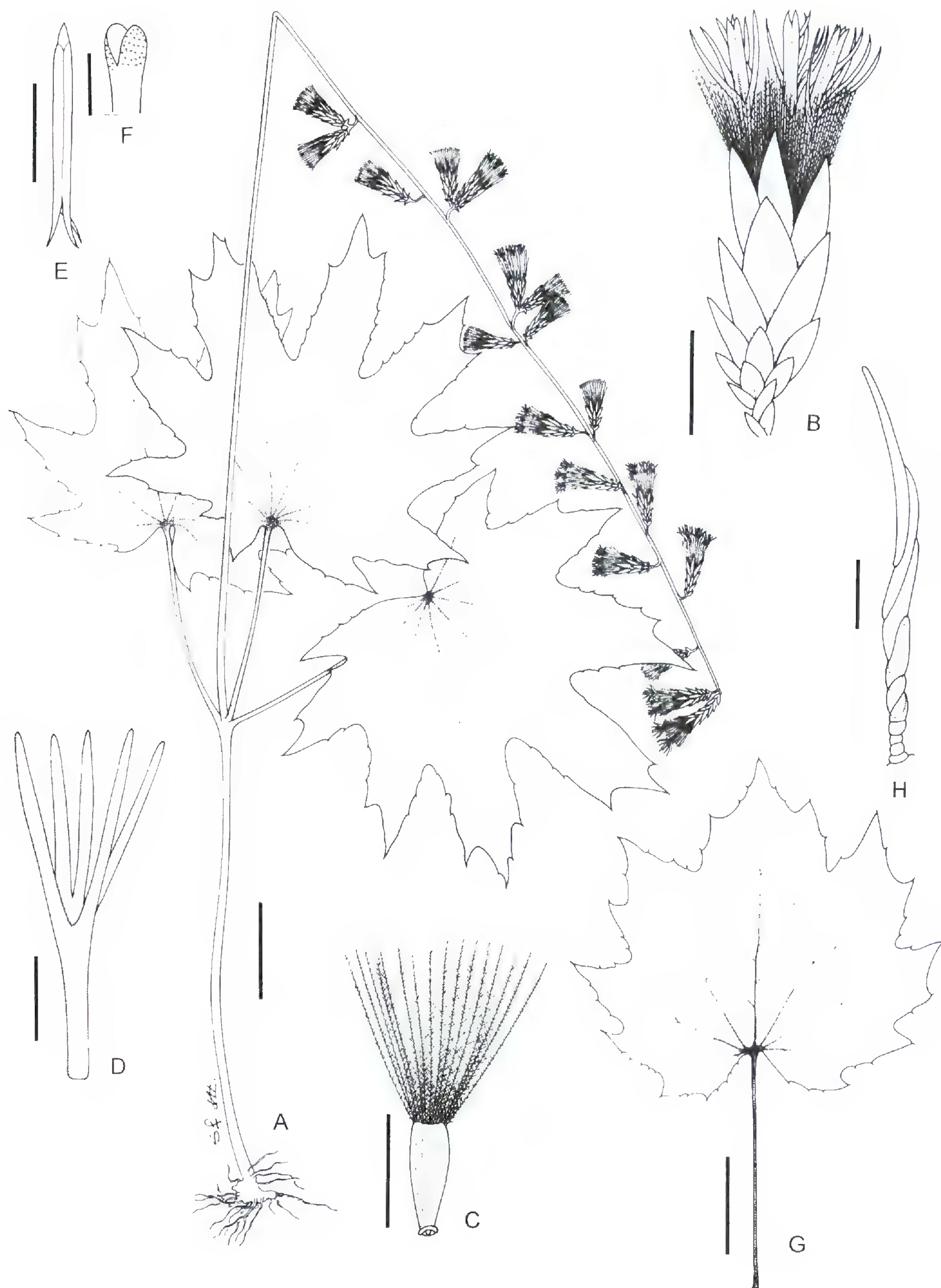


Figure 44. *Ainsliaea acerifolia* Sch. Bip. A–F. *A. acerifolia* var. *acerifolia*. —A. Habit. —B. Capitulum. —C–F. Chasmogamous floret: C. achene with pappus; D. corolla; E. stamen; F. style branches. G, H. *A. acerifolia* var. *subapoda* Nakai. —G. Leaf. —H. Foliar trichome. Scale bars: A = 3 cm; B = 5 mm; C = 5 mm; D, E = 3 mm; F = 1 mm; G = 3 cm; H = 0.1 mm. Drawn from A–F, Maximowicz in 1863 (MO); G, Boufford & Kato 23362 (MO); H, Tagawa 557 (AAU).

haguma (Suzuki 107, UC), Oku-momizigasa (Suzuki 145, UC), Momiji-komori (Hiroe 1167, UC).

Representative specimens examined. CHINA. **Liaoning:** S. C. Cui 314 (PE). JAPAN. Honshu. **Aichi:** Mikawa, Orimoto-tooge, Kami-tsugu-mura, Kita-shitara-gun, 28 Sep. 1955, *M. Furuse s.n.* (S). **Chiba:** Shimoosa, Mt. Ogura, Nikko, *M. Hiroe 1167* (UC). **Fukushima:** Iwaki, Mt. Ohtakine, Takine-machi, Tamura-gun, 7 July 1956, *M. Furuse s.n.* (S); Nishi-shirakawa-gun, Kashi-yama, K. Saito et al. in 1975 (MO). **Gunma:** Aizawa foot of Mt. Arafuma, Nishimoku-mura, Shimonita-machi, Kita-kamra-gun, 3 Sep. 1956, *M. Furuse s.n.* (S, UC); Mt. Myogi, *E. Hulten in 1961* (S); Kodzuke Mt. Akazawa, Agatsuma-gun, S. Kobayashi 12921 (S); Kodzuke, Agatsuma-gun, Shima hot spring, S. Kobayashi 15188 (S); Kodzuke, S slope of Mt. Akazawa, Sawada-mura, Agatsuma-gun, *M. Mizushima 12738* (S); Kodzuke, Mt. Arafune, Kanra-gun, T. Satomi 14467 (S). **Ibaraki:** Hitachi, Mt. Tsukuba, Tsukuba-gun, S. Kobayashi 13627 (S). **Ishikawa:** Hasadani to Koba, Komatsu-shi, M. & T. Takeuchi 14 (CM). **Kyoto:** Yamasiro, Mt. Hiei-zan, M. Tagawa 557 (AAU, C). **Miyagi:** Mt. Fubo-san, Namari-zawa, D. E. Boufford & E. W. Wood 19871 (CM); Sendai, U. Faurie 5451 (W), U. Faurie 6740 (MO, UC); Marumori-cho, Abukuma Mtns., Kosai Pass, J. Iketsu et al. 1099 (CM); Sendai, Saba-Hill, Jisiba in 1927 (W 8655), Jisiba in 1926 (S, UC); Aone-onsen, Kawasaki-cho, Shibata-gun, G. Murata & H. Koyama 41255 (C, CM); Rikuzen, Mt. Funagata, K. Shoma & M. Takahashi in 1974 (MO); Rikuzen, Mt. Kurikoma, S. Sugaya et al. in 1952 (CM, MO); Shichiga-shuku-machi, E side of Mt. Ryuugadake, K. Takaata & H. Kobayashi 575 (MO); Sendai-shi, Aoba-yama, H. Takahashi 1838 (C, NY); Sendai, 9 Sep. 1923, s. coll. (W 4946), 17 Sep. 1923, s. coll. (W 3207). **Nagano:** Minami Alps, Kamiina-gun, Hase-mura, along the trail from Kitazawa-toge to the summit of Mt. Futago, D. E. Boufford & T. Shimizu 23468 (MO); Shinano, Minami-saku-gun, Kita-maki-mura, side of Matsubara-Lake, 25 Sep. 1958, *M. Furuse s.n.* (S); Shinano Koshibu, Ohjika-mura, Shimo-ina-gun, 25 Aug. 1959, *M. Furuse s.n.* (S); Shinano, Mt. Eboshi to Mt. Toyokuchi, Shimo-inagun, G. Murata & T. Shimizu 1530 (S); Shizumo, Gov. Forest, Nagiso-cho, Nishichikumagun, G. Murata et al. 150 (BKF); Hacchozaka to Jumojitoge, Minamisaku-gun, T. Shimizu 13558 (S). **Nara:** Mt. Wasamata-yama, in the Mtns. Oominesan, Kamikitayama-mura, Yoshino-gun, G. Murata 45392 (CM); NW slope of Mt. Wasamata, Kami-kitayama-mura, Yoshino-gun, S. Tsugaru et al. 7348 (CM, MO). **Niigata:** Echigo, Kiyotsu-kyo, Nakauonuma-gun, S. Kobayashi 12864, 14195 (S). **Saitama:** Mt. Mitsumine, S. Suzuki 145 (UC). **Shiga:** Oomi, Sakata-gun, Mt. Ibuki, Ibuki-mura, 22 Sep. 1961, *M. Furuse s.n.* (S). **Tochigi:** Shioya-gun, Fujiwara-cho, Mt. Kogen N of Kinugawa Hot Spring off rte. 119, D. E. Boufford & M. Kato 23362 (MO). **Tokyo:** Musashi, Mt. Takawo, Asakawa-machi, Minami-tama-gun, Tokyo-to, 24 Oct. 1958, *M. Furuse s.n.* (S); "Musasi," Takoasan, 17 Oct. 1907, s. coll. (S). **Toyama:** W Mtn. (Nishi Yama), Sukubo, Yatsuo Town, 20 km NE of Toyama, L. A. Charette 1897 (MO, US); Toyama-Ken, Nakaniikawa-gun, Kamiichi-machi, Takamine-yama, J. Jutila & H. Fujino 751 (MO); Yatsuo Village, 17 km SW of Toyama, S. Kirino 392 (M, MO); Tateyama Nat. Park, Bunazaka, ca. 2.5 km from Bijodaira, Mt. Tateyama, F. H. Utech 98-415 (CM). **Yamagata:** Higashine-shi, Yanagisawa-goya to Mt. Funagatayama, K. Inoue et al. 1760 (NY); Yamagata-shi, Kabuto-iwa (the interior of Yamadera), H. Ohashi et al. 708054 (MO). **Yamanashi:** Kai, Higashi-yamanashi-gun, Mt. Kemtoku, Mitomi-mura, 14 Sep. 1957, *M. Furuse s.n.* (S); rd. from

Yashajin-pass to Minami-omuro lodge, Ashiyasu-mura, Nakakoma-gun, E. Miki et al. 56 (MO); Mt. Hoowoo, S. Suzuki 107 (UC). **Unknown:** Oginohama, U. Faurie 6356 (MO); Tidesan, U. Faurie 1918 (WU); Togakushi, U. Faurie 1920 (WU); Raminatake, Rance & Kessliz in 1886 (W8047); Chitsan, Keisyonando, Chosen Nippon, K. Uno 23338 (NY). SOUTH KOREA. Kwang Nung, Dan Pung Chui, B. C. Chung in 1960 (MO); Kwangnung, Kyonggi-Do, I. C. Chung 7080 (S); "Plantae Coreanae," U. Faurie 409 (UC); Kwang Nung, Dan-pung-chui, Mt. Kwan Aek, I. K. Lee in 1957 (MO); Kyonggi, Kwang Nung, Y. N. Lee & Y. S. Lee 709 (US); Paegyangsang, R. Moran 4722 (UC, US).

2. *Ainsliaea apiculata* Sch. Bip., Jahresber. Pollichia 18–19: 188. 1861. TYPE: Japan. H. Bürger & H. Zollinger 266 (lectotype, designated here, P!). Figure 45.

Plants perennial, herbaceous, 0.8–0.30 m tall; stems 1(2) erect, unbranched (occasionally branched at the base of the inflorescence), few leafy, loosely strigose. Leaves basally clustered, rosulate, long-petiolate; petioles wingless, twice as long as the blades, 1.5–6 cm, strigose; leaf blades chartaceous, usually palmately lobed; blackish green, slightly glassy above and pale opaque below, sparsely strigose on both sides, with long straight trichomes; cauline leaves few, much reduced, alternate, short-petiolate to sessile, ovate to ovate-lanceolate. Capitula subsessile, arranged in a stachyoid inflorescence; peduncles with many minute bracteoles, with upper bracts transitioning to involucre; involucre 5- or 6-seriate, narrowly obdeltate, (8)11–15 × ca. 3 mm; phyllaries papyraceous, glabrous; outer bracts ovate, apically acute, ca. 2 × 1 mm, inner bracts linear, apically acute, 3- to 5-nerved, ca. 10 × 1 mm. Florets 3, hermaphrodite, cleistogamous and chasmogamous (at different seasons and within a single plant), corollas white; *chasmogamous* florets with corolla ligulate, 9–11 mm, lobes 3–5 mm (deeper slit 4–6 mm), tube ca. 5 mm; anthers ca. 3 mm, apical appendages rounded, ca. 0.5 mm, sagittate; tails 1.2–1.5 mm, shortly pilose; style branches short, truncate, ca. 0.3–0.4 mm. Achenes oblong, ca. 2 mm long, short-pilose, 10-nerved; pappus bristles 34 to 36, ca. 6 mm; *cleistogamous* florets with corolla tubulose to pseudo-ligulate, 5-lobed, 5–6 mm, lobes 0.5 mm (deeper slit ca. 0.8 mm), tube 4–5 mm; anthers ca. 2 mm; style branches ca. 0.3 mm. Achenes ca. 5 mm; pappus bristles ca. 9 mm.

Distribution. Japan (Honshu, Kyushu), Taiwan, and South Korea (Fig. 3B).

Discussion. Schulz Bipontinus (1861) mentioned two syntypes in the protologue of *Ainsliaea apiculata*: "Japonia: Dr. Bürger! et Zollinger! N.266 et ed. Göring n.217b." I selected as lectotype Bürger & H.

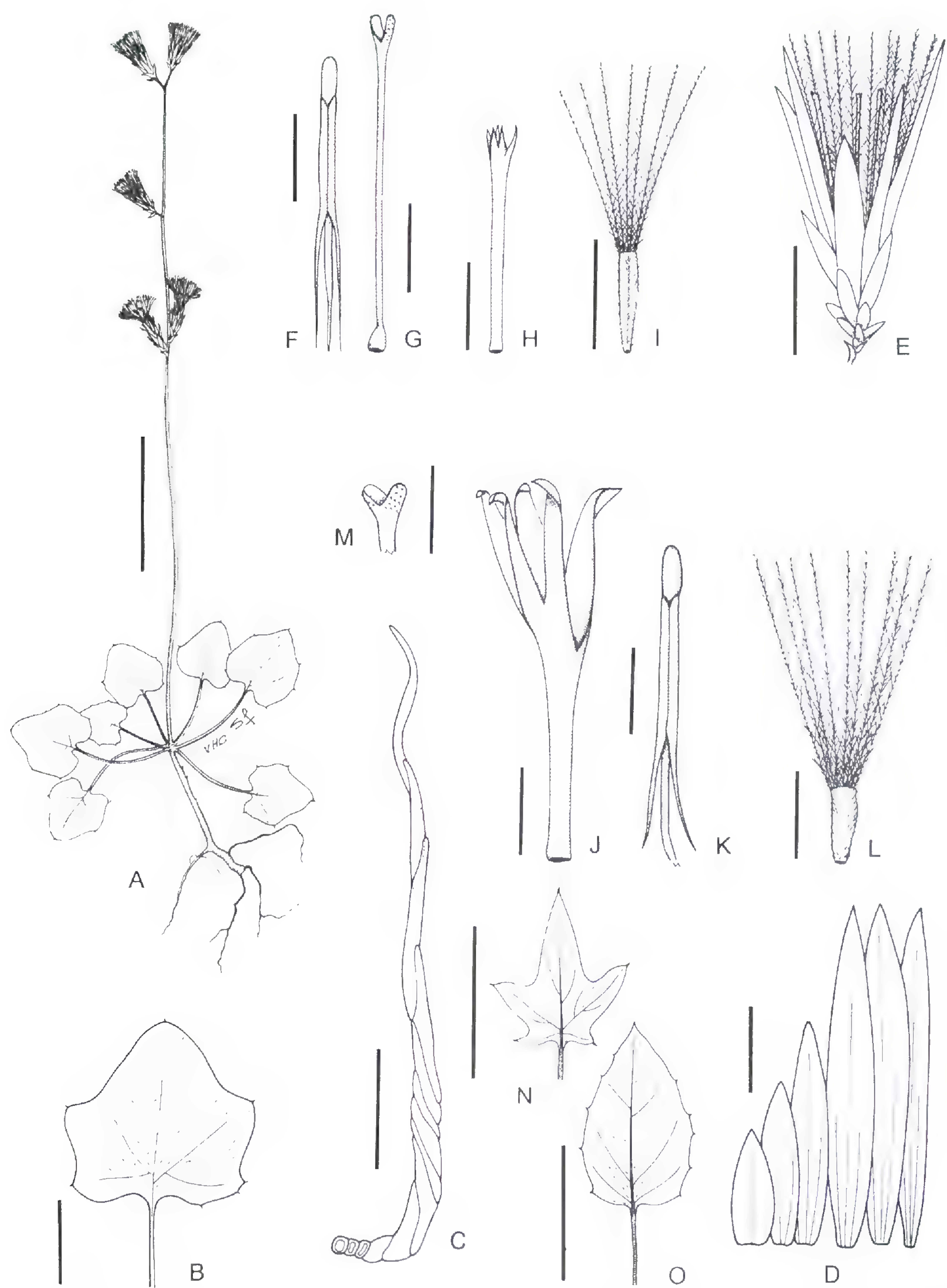


Figure 45. *Ainsliaea apiculata* Sch. Bip. A–M. *A. apiculata* var. *apiculata*. —A. Habit. —B. Leaf. —C. Foliar trichome. —D. Phyllaries. —E. Capitulum. —F–I. Cleistogamous floret: F, stamen; G, style; H, corolla; I, achene with pappus. —J–M. Chasmogamous floret: J, corolla; K, stamen; L, achene with pappus; M, style branches. —N. *A. apiculata* var. *acerifolia* Masam. Leaf. —O. *A. apiculata* var. *oratifolia* Masam. Leaf. Scale bars: A = 2.5 cm; B = 1.5 cm; C = 0.2 mm; D, H, J, L = 2 mm; E, I = 5 mm; F = 0.5 mm; G, K, M = 1 mm; N = 3 cm; O = 2 cm. Drawn from A, D–M, Furuse in 24 Oct. 1958 (S); B, C, Furuse in 4 Nov. 1955 (S); N, the neotype Muramatsu in 1935 (KYO); O, Tashiro in 1918 (KYO).

Zollinger 266, kept at P, because I was unable to see the syntype Göring 217b deposited at P.

Miquel (1866: 187) established *Ainsliaea apiculata* var. *minor* because of its leaves 1.2 cm long and stems between 5 and 12 cm tall. Although I was unable to find the collection “*In m. Higosan, m. Nov fructiferam, Siebold.*” on which Miquel based *A. apiculata* var. *minor*, these characters are within the range of variation for *A. apiculata*.

Masamune (1934) described five varieties of *Ainsliaea apiculata* from Japan. Kyushu (Yakushima), i.e., *A. apiculata* var. *scapifolia*, *A. apiculata* var. *multiscapa*, *A. apiculata* var. *rotundifolia*, *A. apiculata* var. *acerifolia*, and *A. apiculata* var. *ovatifolia*, based on "Ipse, 7 June 1928," "Ipse, Kosugidani, ca. 600 m, Aug. 1928," "Ipse, July 25 1924," "Ipse, July 29, 1924," and "Ipse, Kosugidani, 1928," respectively. I have been unable to locate these collections, including at the herbaria where they should be located (KANA, TAI, TI). Although it is difficult to ascertain the identities of these taxa without type material, according to the protologues, *A. apiculata* var. *scapifolia*, *A. apiculata* var. *multiscapa*, and *A. apiculata* var. *rotundifolia* are based on characters that are within the range of variation for *A. apiculata* (leafy stems with obovate to lanceolate leaves; branched stems with three to five palmate to dentate leaves, and rounded to cordate leaves, respectively). However, the characters mentioned by Masamune for *A. apiculata* var. *acerifolia* and *A. apiculata* var. *ovatifolia* separate them as distinct taxa. Consequently, *A. apiculata* is recognized in this treatment as a complex of three varieties growing sympatrically, which are probably separated ecologically or by their mode of reproduction (only cleistogamous florets have been observed in varieties *acerifolia* and *ovatifolia*).

Key to the varieties of Ainsliaea apiculata in Japan, Taiwan, and South Korea

- 1a. Leaf blade entire or shallowly 5-lobed.
 - 2a. Leaf blade subrotundate or ovate, 5-angled or shallowly 5-lobed with terminal lobe often elongate, slightly cordate at the base; blades palmatelyveined 2a. var. *apiculata*
 - 2b. Leaves ovate, acute, rounded at the base, mucronate-toothed on margins; blades palmate-pinnate 2c. var. *ovatifolia*
- 1b. Leaf blade deeply lobed with elongated apical lobe 2b. var. *acerifolia*

2a. *Ainsliaea apiculata* Sch. Bip. var. *apiculata*.
Figure 45A–M.

Leaf blades subrotundate or ovate, 5-angled or shallowly 5-lobed, $1\text{--}3.5 \times 1\text{--}3$ cm, lobes obtuse, mucronulate, terminal lobe often elongate. Florets all cleistogamous, cleistogamous and chasmogamous, or all chasmogamous.

Distribution and phenology. Japan (Honshu, Shikoku (Masamune, 1934), Kyushu) and South Korea. It was collected on hills and lower slopes in deciduous forest and *Cryptomeria japonica* (Thunb. ex L. f.) D. Don forest, at elevations between 140 and 1000 m; flowering from September to December.

Vernacular names. Kikkô-haguma (*Jisiba* in 1927, W; Suzuki 93, UC; Masamune, 1934), Maruba-kikkô-haguma (Masamune, 1934), Tagyô-kikkô-haguma (Masamune, 1934), and Tôzaki-kikkô-haguma, (Masamune, 1934), Sashi haguma (*Tanaka in 1872*, W).

Representative specimens examined. JAPAN. Honshu. **Aichi:** Mikawa, Kita-shitara-gun, Nagura-mura, Oo-nagura, along Kamsa R., 27 Oct. 1957, *M. Furuse s.n.* (S). **Chiba:** Mt. Kiyosumi, S. Suzuki 141 (UC). **Gunma:** Kodzuke, Mt. Myogi, Kanra-gun, S. Satomi 15301 (S). **Hiroshima:** Miyajima Isl., M. Hiroe 12044 (UC). **Hyogo:** "Harima" [Arima], S. Arimoto in 1913 (MO 3935593); Arima, Mt. Sepiko, Shikatani-mura, Shikama-gun, 24 Sep. 1960, *M. Furuse s.n.* (S). **Ibaraki:** Hitachi, Mt. Tsukuba, Tsukuba-machi, Tsukuba-gun, S. Kobayashi 15169 (S). **Ishikawa:** Takatsuboriyama, Togimachi, Hakui-gun, H. Kanai 655 (BKF, CANB, M, NY, UC); Sagami, Mt. Shiro-yama, Nakano-machi, Tsukui-gun, S. Kobayashi 12982, 15175 (S). **Kanagawa:** Fujiyama, U. Faurie 6611 (MO); Sagami, Mt. Kimtoki, halfway from forest Hakone, 30 Sep. 1961, *M. Furuse s.n.* (S); Tagata-gun, Nekko kami-kano-mura, 4 Nov. 1955, *M. Furuse s.n.* (S p.p., UC); Idzu, Isl. Oshima, S. Kobayashi 15072 (S); Sagami, Mt. Komagatake, Hakone, S. Kobayashi 15174 (S); "Izu," Mt. Amagi, Tagata-gun, S. Kobayashi 16547 (S); Mt. Ooyama, S. Suzuki 93 (UC). **Mie:** Tado Range, Tado Shrine, N. Takaki in 1957 (CM). **Miyagi:** Kessennuma, U. Faurie 6079 (MO); Sendai, 3 Feb. 1927, *Jisiba s.n.* (W). **Tochigi:** Shiobara, U. Faurie 4220 (MO). **Tokyo:** Tokyo-to, Musashi, Minamitamagata-gun, Asakawa-machi, Mt. Takawo, 24 Oct. 1958, *M. Furuse s.n.* (S); Tokyo, s. coll. 823, p.p. (C); Oum-shi, Nagafuchi, H. T. Im & T. Kawahara 7815 (NY); Yokohama, O. Kuntze 3280 (NY); Yokohama, C. Maximowicz 13147 (M, MO, W); Yokohama, Wawra 1493 (NY, W); Musashi, Takoasan, 17 Oct. 1907, s. coll. (S); Musashi, Ogikubo?, 21 Sep. 1910, s. coll. (US). **Toyama:** Yatsuo Village, 19 km SW of Toyama city, on slopes of Amid Mtns., S. Kirino 356 (MO). **Yamaguchi:** in the village Misyo, 3 mi. SW of Yokoyama vill., Iwakuni (25.6 mi. W of Hiroshima city) base of W slope of Castle Mtn. (Shiro-Yama) Nat. Forest, N bank of Nishiki R., L. A. Charette 1525 (MO, S, UC, US). **Wakayama:** Kii, Mt. Koya, near Okunoin, M. Tamura 9327 (S). Kyushu. **Kagoshima:** Oshumi, Mt. Takakuma, Kawagoe in 1917 (US), G. Masamune in 1922 (NY); Yakushima, Osumi Gunto, along railroad from Ambo to Kasugidani at 16 km, R. Moran 5333, p.p. (UC); Yakushima, Z. Tashiro in 1918, p.p. (KYO); Yakushima, Kasugidani, G. Yamaguchi & T. Nagano in 1917, p.p. (KYO). **Nagasaki:** E middle elev. of Mt. Ariake, Izuhara-cho, Shimoagata-gun, Tsushima Isl., H. Koyama 2678 (BKF, US); Nagasaki, C. Maximowicz in 1863 (MO, S). **Unknown:** Kyushu, Hakogaki, Kasusjagun, Fukuskaken, K. Ichikawa 128 (C, S, US, W); Sanchi Ojihen, Y. Tanaka 16 (W); Takehara, Y. Watabiki in 1902 (NY); Goring 217b (paratype of *A. apiculata*, P not seen; P photo LP!); s. loc., A. Bay s.n. (PENN 810779). SOUTH KOREA. Cheju-do (Quelpaert Island), 21 May 1946, s. coll. 8823 (S); "in silvis Mallaisan," T. Taquet 243 (W); "Hallaiken"?, T. Taquet 1062 (C).

2b. *Ainsliaea apiculata* var. *acerifolia* Masam. Mem. Fac. Sci. Taihoku Imp. Univ. 11(4): 455. 1934. TYPE: Japan, s. loc., 17 Aug. 1935, *Herb. Muramatsu s.n.* (neotype, designated here, KYO!). Figure 45N.

Ainsliaea liukuensis Beauverd, Bull. Soc. Bot. Genève, Sér. 2, 1: 382. 1909. TYPE: Japan. Yakushima (Liu kiu), July 1900, *U. Faurie* 4066 (type, KYO!).

Ainsliaea secundiflora Hayata, J. Coll. Sci. Imp. Univ. Tokyo 30: 162. 1911. Syn. nov. *Ainsliaea macroclinidioides* var. *secundiflora* (Hayata) Kitam., J. Jap. Bot. 14: 307. 1938. TYPE: Japan. Koshun, Botanrosha, Dec. 1906, *Nakahara* 922 (holotype, TI not seen; isotype, TI photo A!, LP!).

Leaves (1)2.5–3.5 × (1.1)2–3 cm, deeply lobed with apical lobe elongate. Florets cleistogamous.

Distribution and phenology. Japan (Kyushu and Honshu) and Taiwan; collected in forest in mossy places, at elevations between 1600 and 1800 m; flowering in February, March, September, and October.

Discussion. Because no authentic material of *Ainsliaea apiculata* var. *acerifolia* (“*Ips*e, July 29, 1924”) has been found at KANA, TAI, or TI, where the original herbarium of Masamune is kept (see discussion in *A. apiculata*), the collection *Muramatsu* in 1935 (KYO), which agrees in all respects with the protologue of *A. apiculata* var. *acerifolia*, has been chosen as neotype.

Relationships. *Ainsliaea secundiflora* Hayata is proposed as a new synonym of *A. apiculata* var. *acerifolia* because there is no diagnostic character that differentiates the former from the latter. Both have long-petiolate leaves that are palmately 5-lobed with an elongate terminal lobe and deeply cordate at the base.

Vernacular names. Momiziba-kikkô-haguma (Masamune, 1934; Hori et al., 1988), Ryūkyū-haguma (Kitamura, 1965).

Representative specimens examined. JAPAN. Honshu. **Ishikawa:** Sagami, Mt. Shiroyama, Nakano-machi, Tsukui-gun, *M. Mizushima* 13199 (S). **Kanagawa:** Tagata-gun, Nekko kami-kano-mura, 4 Nov. 1955, *M. Furuse* s.n., p.p. (S). **Tokyo:** Tokyo, s. coll. 823, p.p. (C). Kyushu. **Kagoshima:** Yakushima, Yaku-cho, Hana-no-eigo, *D. E. Boufford* & *S. Mitsuta* 20043 (CM, MO); Yakushima, Aug. 1900, *U. Faurie* s.n. (KYO); Yakushima, Ohsumi, Sep. 1921, *G. Koidzumi* s.n. (AAU, CANB, KYO p.p., MO, PENN); Yakushima, Mt. Miyanonradake, Sep. 1921, *G. Koidzumi* s.n. (KYO); Isl. Yakushima, *K. Shimizu* & *I. Kozima* 33 (KYO); Yakushima, inter Anbo et Kosugi-dani, *M. Tagawa* & *Motozi* 1921 (KYO); Yakushima, Kiusiu, 6 Aug. 1918, *Z. Tashiro* s.n., p.p. (KYO); Yakushima, 9 Aug. 1918, *Z. Tashiro* s.n., p.p. (KYO); Yakushima, Kosugidami, 26 July 1917, *G. Yamaguchi* & *T. Nagano* s.n., p.p. (KYO); Yakushima, Mt. Miyanoura, 28 July 1917, *G. Yamaguchi* & *T. Nagano* s.n. (KYO). TAIWAN. Prov. Takao, Mt. Daijuring, *S. Kitamura* in 1932 (KYO); Mt. Arisan, *S. Sasaki* in 1919 (KYO); Funki, *T. Sata* in 1932 (MICH); Taitô-chô, Asahi, *T. Tanaka* 10392 (C, NY, UC); Ping tung, Ali, *H. N. Yang* 2039 (CM).

2c. *Ainsliaea apiculata* var. *ovatifolia* Masam. Mem. Fac. Sci. Taihoku Univ.: 455. 1934. TYPE:

Japan. Kyushu. Kagoshima: Rte. from Takatskagoya to Mt. Miyanoura, Yaku-cho, 1300–1700 m, 3 Aug. 1974, *G. Murata* & *H. Tabata* 418 (neotype, designated here, KYO!). Figure 450.

Leaves ovate, 1.5–2.2 × 1.2–1.8 cm, apex acute, rounded at the base, mucronate-toothed on margins. Florets cleistogamous.

Distribution and phenology. Japan (Kyushu, Yakushima); collected at elevations between 1300 and 1700 m, in mossy places; flowering in August and December.

Discussion. Because no authentic material of *Ainsliaea apiculata* var. *ovatifolia* (“*Ips*e, Kosugidani, 1928”) has been found at KANA, TAI, or TI, where the original herbarium of Masamune is kept (see discussion in *A. apiculata*), the collection *G. Murata* & *H. Tabata* 418 (KYO), which agrees in all respects with the protologue of *A. apiculata* var. *ovatifolia*, has been chosen as the neotype.

Vernacular name. Tamagoba-kikkô-haguma (Masamune, 1934; Hori et al., 1988).

Representative specimens examined. JAPAN. Kyushu. **Kagoshima:** Yakushima, Ohsumi, *G. Koidzumi* in 1921 (KYO p.p.); Yakushima, Ohsumi Gunto, along railroad from Ambo to Kosugidani at 16 km, *R. Moran* 5333, p.p. (UC); Yakushima, Kiusiu, 6 Aug. 1918, *Z. Tashiro* s.n., p.p. (KYO).

3. *Ainsliaea apteroides* (C. C. Chang) Y. C. Tseng, Acta Phytotax. Sin. 31: 363. 1993. Basionym: *Ainsliaea pteropoda* var. *apteroides* C. C. Chang, Sinensia 4: 227. 1934. TYPE: China. Yunnan: Mi lêh district, mountain forest, *A. Henry* 9907A (holotype, K not seen; isotypes, K photo LP!, US!). Figure 46.

Plants perennial, herbaceous, 0.20–0.45 m tall; stems erect, unbranched, leafy, lanuginose. Leaves basally clustered, rosulate (occasionally clustered above the base), long-petiolate; petioles wingless, 4–5(9) cm, flat; leaf blades chartaceous, ovate, 5–8 × 3.5–5 cm, apex acute to acuminate (rarely obtuse), base slightly cordate to cordate, margins obscurely denticulate; upper surface sparsely lanate, lower surface white-lanate, with long crisped trichomes, and scattered long straight and short capitate glandular trichomes (subglabrate at maturity); palmate-pinnate, 3-nerved; cauline leaves alternate, shortly petiolate to sessile, similar to the base, gradually reduced upward to the base of the inflorescence, ovate to lanceolate or lanceolate, discolored, upper surface lanuginose and lower surface densely white-tomentose. Capitula subsessile, to shortly pedunculate, arranged in a stachyoid in-



Figure 46. *Ainsliaea apteroides* (C. C. Chang) Y. C. Tseng. —A. Habit. —B, C. Foliar trichomes. —D. Phyllaries. —E. Capitulum. —F. Chasmogamous floret. —G. Stamen of chasmogamous floret. —H. Style branches of chasmogamous floret. —I. Cleistogamous floret. Scale bars: A = 3 cm; B, C = 0.1 mm; D = 3 mm; E = 5 mm; F, I = 5 mm; G, H = 2 mm. Drawn from A, D, E, the isotype *Henry 9907 A* (US); B, C, *Henry 9907* (NY); F–H, (W 7213); I, *Biswas in 1935* (US).

florescence; peduncles bracteolate; involucre 5-seriate, cylindrical, $11\text{--}15 \times 5\text{--}7$ mm; phyllaries subcoriaceous, glabrous; outer phyllaries ovate, acute, $1.5\text{--}3 \times 1\text{--}1.3$ mm; inner phyllaries linear to lanceolate, acuminate, 3-nerved, $7\text{--}12 \times 1\text{--}1.8$ mm. Florets 3, hermaphrodite, chasmogamous and cleistogamous (at different seasons); *chasmogamous florets* with corollas ligulate, ca. 12 mm, lobes ca. 6 mm (deeper slit ca. 7 mm), tube ca. 5 mm; anthers ca. 5 mm, apical appendages truncate, ca. 1.2 mm, sagittate; tails ca. 2 mm, shortly pilose; style branches short, rounded, ca. 0.5 mm. Achenes linear-obovate, 5–6 mm long, 10-nerved, pilose; pappus bristles ca. 38, ca. 6 mm; *cleistogamous florets* with corollas tubulose to pseudoligulate, ca. 4 mm, shortly 5-lobed (deeper slit ca. 0.3 mm); anthers much reduced, ca. 1 mm; style branches ca. 0.6 mm. Achenes 5.5–6 mm; pappus bristles ca. 7 mm.

Distribution and phenology. Bhutan, China (Sichuan, Yunnan), and India in mountain forest, at ca. 1800 m; collected in flower in February.

Relationships. *Ainsliaea apteroides* resembles *A. bonatii* in habit and capitulescence. Both species have sessile capitula, rosulate leaves long-petiolate, with typically cordate leaf blades, and the lower blade surface white-tomentose. *Ainsliaea apteroides* has ovate leaf blades, acute to acuminate at the apex (vs. widely ovate to suborbicular leaf blades, obtuse to rounded at the apex), and petioles wingless (vs. broadly winged). *Ainsliaea apteroides* also resembles *A. aptera* in its ovate, acuminate leaf blades and petioles wingless, but *A. aptera* is quite distinct from *A. apteroides* by the leaf blades with dentate margins (vs. obscurely denticulate).

Representative specimens examined. BHUTAN. "Bootan." s. loc., s. coll. (W 7213). CHINA. **Yunnan:** Mengtze, *A. Henryi* 9907 (MO, NY); Lunan Xian, *K. Hou* 74327 (MO). **Sichuan:** Chiu-Lung-Hsien Terr. E of the Yalung River, *J. F. Rock* 17427 (S, US, W). INDIA. Eastern Himalaya, *K. Biswas* in 1935 (US).

4. *Ainsliaea cordifolia* Franch. & Sav., Enum. Pl. Jap. 2: 416. 1879. TYPE: Plate sub. "Teishô sô," in Sômoku-Dzusetsu, 16: 7. 1862 (lectotype, designated here). Japan. Honshu. Mie Prefecture: Prov. Kii, Kowadani, ravine Kowa, Owase-machi, Kitamuro-gun, 7 Oct. 1956, *M. Furuse* s.n. (epitype, designated here, S!; duplicate, UC!). Figure 47.

Ainsliaea maruoi Makino, Bot. Mag. 28(334): 290. 1914. TYPE: Japan. Honshu: Totomi, Aug. 1913. *S. Maruo* s.n. (holotype, MAK!).

Plants perennial, herbaceous, (0.20)0.30–0.45 (0.70) m tall; stems erect, simple, rarely branched

above, glabrous or loosely strigose. Leaves clustered at the median part of the stem or crowded above the base; longly petiolate, petioles wingless, flat, as long as the blade, 6–13.5 cm, sparsely strigose; leaf blades chartaceous, ovate to subreniform, (4)8–12(16) $\times$ (3.5)5–10.5(12.5) cm, sagittate at the base, obtuse to acute at the apex, pinnately lobed; subglabrous and green above, slightly paler and strigose with long straight trichomes below; palmati-pinnate, 3- to 5-nerved. Capitula subsessile, arranged in a stachyoid inflorescence; peduncles 2–3 mm, bracteolate, with upper bracts transitioning to involucre; involucre 7-seriate, $10\text{--}14 \times 3\text{--}4$ mm, narrowly obdeltate; phyllaries papyraceous, purple toward the margins above; outer phyllaries ovate, acute, ca. 3×1.5 mm, pilose at the apex; inner phyllaries narrowly oblong, acute, conspicuously 3- to 5-nerved, ca. 10×1 mm, glabrous. Florets 3, hermaphrodite, chasmogamous; corolla ligulate, ca. 15 mm, lobes 6–8 mm (deeper slit ca. 9 mm), tube ca. 6 mm; anthers 6–8 mm, apical appendages apiculate, ca. 1 mm, sagittate; tails ca. 1.5 mm, smooth to slightly pilose; style branches obtuse, ca. 0.7 mm. Achenes oblong, 4–6.5 mm, 10-nerved, glabrous; pappus bristles ca. 45, ca. 8 mm.

Distribution and phenology. Japan (Honshu, Shikoku), collected in shaded mountain forest (Fig. 4A); flowering in August, October, and November.

Discussion. The protologue of *Ainsliaea cordifolia* does not include any reference to the collector: "Hab. in montibus provinciarum insulae Nippon centralium, v.c. Kishiou, Yamato, Ise." The name of this species is accompanied by an illustration in Iinuma (1862, 16: 7), which is here selected as the lectotype. Because the illustration does not include dissections showing essential characters, I also propose the collection "M. Furuse in 1956" kept at S (duplicate, UC), which is in accordance with the protologue, as epitype of *A. cordifolia*.

Vernacular names. Teishô sô (Iinuma, 1862; Kitamura, 1965), Hiroha-teishoso (Makino, 1914).

Relationships. *Ainsliaea cordifolia* resembles *A. acerifolia* in its anthers and leaves. Both species have anthers with apiculate anther appendages and lobed leaves. *Ainsliaea cordifolia* is easily distinguished by its leaf blades pinnately lobed (vs. palmatilobed) and sagittate at the base (vs. cordate at the base).

Representative specimens examined. JAPAN. Honshu. **Chiba:** Awa, Awa-gun, Amatsu-machi, Mt. Kiyosumi on S side, 1 Nov. 1958, *M. Furuse* s.n. (S). **Tottori:** Totomi, Kasamisi-mura, 31 Oct. 1912, s. coll. (S). Shikoku. **Kagawa:** Shionoe-machi, Mt. Ohtaki-san, *M. Uchida* in 1969 (CM). **Unknown:** Kiyosumi-san, Boshu, 28 Oct. 1894, s. coll. (US 248117); s. loc., July 1931, s. coll. (MAK 248107); s. loc.,

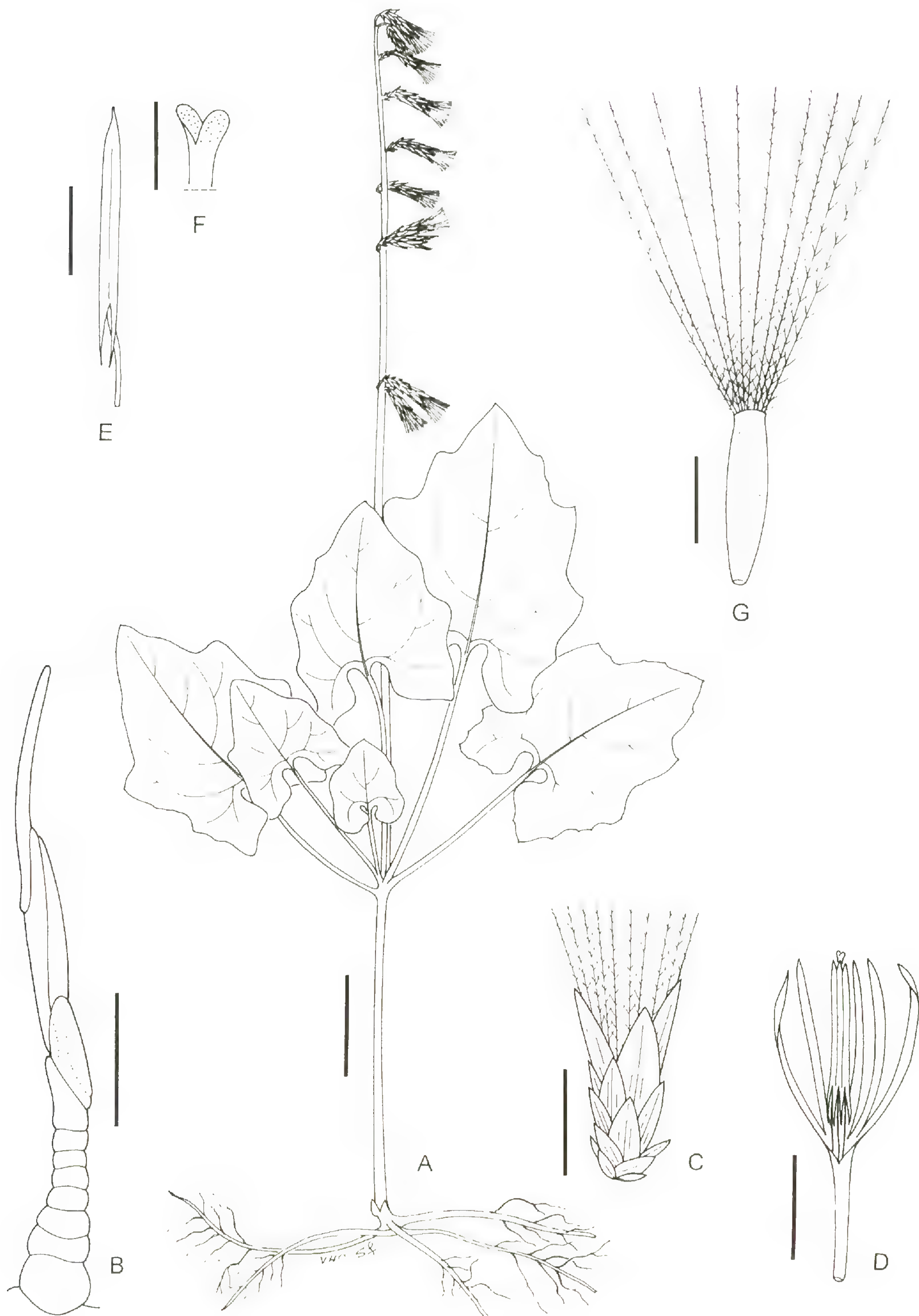


Figure 47. *Ainsliaea cordifolia* Franch. & Sav. —A. Habit. —B. Foliar trichome. —C. Capitulum. —D. Chasmogamous floret without achene and pappus. —E. Stamen. —F. Style branches. —G. Achene with pappus. Scale bars: A = 3 cm; B = 0.1 mm; C, D = 5 mm; E, G = 2 mm; F = 1 mm. Drawn from A, C–G, Oct. 1894, s. coll. (US 248117); B, *Furuse in 1956* (UC).

year 1935, s. coll. (MAK 247863); s. loc., *N. Satomi* in 1957 (MAK).

5. *Ainsliaea dissecta* Franch. & Sav., Enum. Pl. Jap. 2: 416. 1879. TYPE: Plate sub “Enshû-haguma” Sômoku-Dzusetsu, 16: 5. 1862 (lectotype, designated here). Japan. Honshu. Tottori Prefecture: Prov. Totomi, Mt. Hakko, Haibara-gun, 19 Oct. 1951, *J. Sugimoto 10912* (epitype, designated here, S!). Figure 48.

Plants perennial, herbaceous, 0.16–0.45 m tall; stems unbranched (occasionally branched above leaves, resulting in 3- or 4-flower stems), glabrous. Leaves crowded above the base, falsely verticillate, long-petiolate; petioles wingless, flat, about twice as long as the blades, 5–12(17) cm; leaf blades membranous, cordate at the base, palmately lobed to more commonly palmately 3-parted cordate, (2)4–5(7.5) × (2)4–5(8) cm, lateral segments deeply 2-lobed, terminal segment 3-lobed, lobes coarsely mucronate-toothed; subglabrous on both surfaces with long straight trichomes of 1–1.5 mm; palmativeined. Capitula subsessile, arranged in a stachyoid inflorescence; peduncles bracteolate, with upper bracts transitioning to involucre; involucre 7- or 8-seriate, cylindrical, 8–13 × 3–4 mm; phyllaries papyraceous, purpureous toward the tip, glabrous; outer phyllaries ovate, acute, 1–1.5 × ca. 1 mm; inner phyllaries linear, acuminate, conspicuously 3- to 5-nerved, ca. 11 × 0.7 mm. Florets 3, hermaphrodite, chasmogamous; corolla ligulate, ca. 12.5 mm, lobes 6–6.5 mm (deeper slit ca. 7 mm), tube ca. 5 mm; anthers 5.5–7 mm, apical appendages apiculate, ca. 0.8 mm, sagittate; tails smooth to slightly pilose, 1.5–2 mm; style branches obtuse to acute, ca. 1 mm. Achenes oblong, flattened, 6.5–11 mm, 9-nerved, glabrous; pappus bristles 30 to 33, 8–12 mm.

Distribution and phenology. Japan (Honshu), collected in mountainous woods between 300 and 680 m (Fig. 4A); flowering in September and October, fruiting in November.

Discussion. The protologue of *Ainsliaea dissecta* does not include any reference to the collector: “Hab. in montibus editissimis, v. c. Fudsi yama, teste Inouma.” The name of this species is accompanied by an illustration in Inouma (1862, 16: 5), which is here selected as the lectotype. Because the illustration does not include dissections showing essential characters, I also propose the collection *J. Sugimoto 10912*, kept at S, which is in accordance with the protologue, as epitype of *A. dissecta*.

Vernacular names. Ensyu-haguma (*M. Furuse* in 1955, MO, S, UC), Enshû-haguma (Inouma, 1862; Kitamura, 1965).

Relationships. *Ainsliaea dissecta* is easily distinguished from other species of the sect. *Aggregatae* with apiculate anther appendages (*A. acerifolia* and *A. cordifolia*) by its leaf blades that are palmately 3- to 5-divided.

Representative specimens examined. JAPAN. Honshu. **Aichi:** Prov. Mikawa, Mt. Hooraiji, Hooraiji-machi, Minami-shitara-gun, 28 Oct. 1957, *M. Furuse s.n.* (S); Mt. Danto, Oh-nagura, Nagura-mura, Kita-shitara-gun, 29 Sep. 1955, *M. Furuse s.n.* (S, UC); Mt. Horaijisan, Horai-cho, Minamishitara-gun, *G. Murata 41060* (CM). **Shizuoka:** Miyakoda, N of Hamamatsu, *F. Konta & M. Wakabayashi 357* (AAU, BKF, CM, MO, NY). **Tottori:** Prov. Totomi, Awagatake, s. coll. (S).

6. *Ainsliaea gracilis* Franch., J. Bot. (Morot) 8: 297. 1894. TYPE: China. Sichuan: Su-tchuen oriental, Tchen-keou-tin, *R. P. Farges 1034A* (type, P!). Figure 49.

Plants perennial, herbaceous, 0.20–0.45 m tall; stems erect, unbranched (rarely branched above), glabrous. Leaves clustered above the base, falsely verticillate, long-petiolate; petioles wingless, flat, subglabrous, 2–3.2 cm; leaf blades chartaceous, ovate or ovate to lanceolate, 2–3.5(7) × 1.9–3 cm, base slightly cordate or rounded to truncate, apex acuminate, margins obscurely dentate; discolorous, upper surface green, subglabrous, and lower surface purplish green, and loosely strigose with long straight trichomes. Capitula sessile to shortly pedunculate, arranged in a stachyoid inflorescence; peduncles bracteolate; involucre 5- or 6-seriate, cylindrical, ca. 10 × 3 mm; phyllaries papyraceous, glabrous; outer phyllaries ovate, acute, ca. 1.5 × 1 mm; inner phyllaries linear to lanceolate, acute to acuminate, 3- to 5-nerved, ca. 10 × 1.2 mm. Florets 3, hermaphrodite, chasmogamous and cleistogamous (usually in single plant), corollas white; *chasmogamous florets* with corolla ligulate, ca. 9 mm, lobes ca. 3 mm (deeper slit ca. 4.5 mm), tube ca. 4.5 mm; anthers ca. 4 mm, apical appendages rounded, ca. 0.5 mm, sagittate; tails ca. 1.5 mm, shortly pilose; style branches shortly bilobate, ca. 0.3 mm. Achenes linear to oblong, 2–4 mm, 10-nerved, glabrous or more commonly pilose above; pappus bristles ca. 37, ca. 5.5 mm; *cleistogamous florets* with corolla tubulose to pseudoligulate, ca. 5 mm, 5-lobed, lobes ca. 1.5 mm (deeper slit ca. 2 mm); anthers ca. 2 mm; style branches ca. 0.5 mm. Achenes 5 mm; pappus bristles ca. 8 mm.

Distribution and phenology. Central China (Guangdong, Guangxi, Guizhou, Hubei, Hunan, Sichuan). It was collected under shrubs on shaded banks, at elevations between 600 and 1500 m (Fig. 4B); flowering in August and October, fruiting in December.

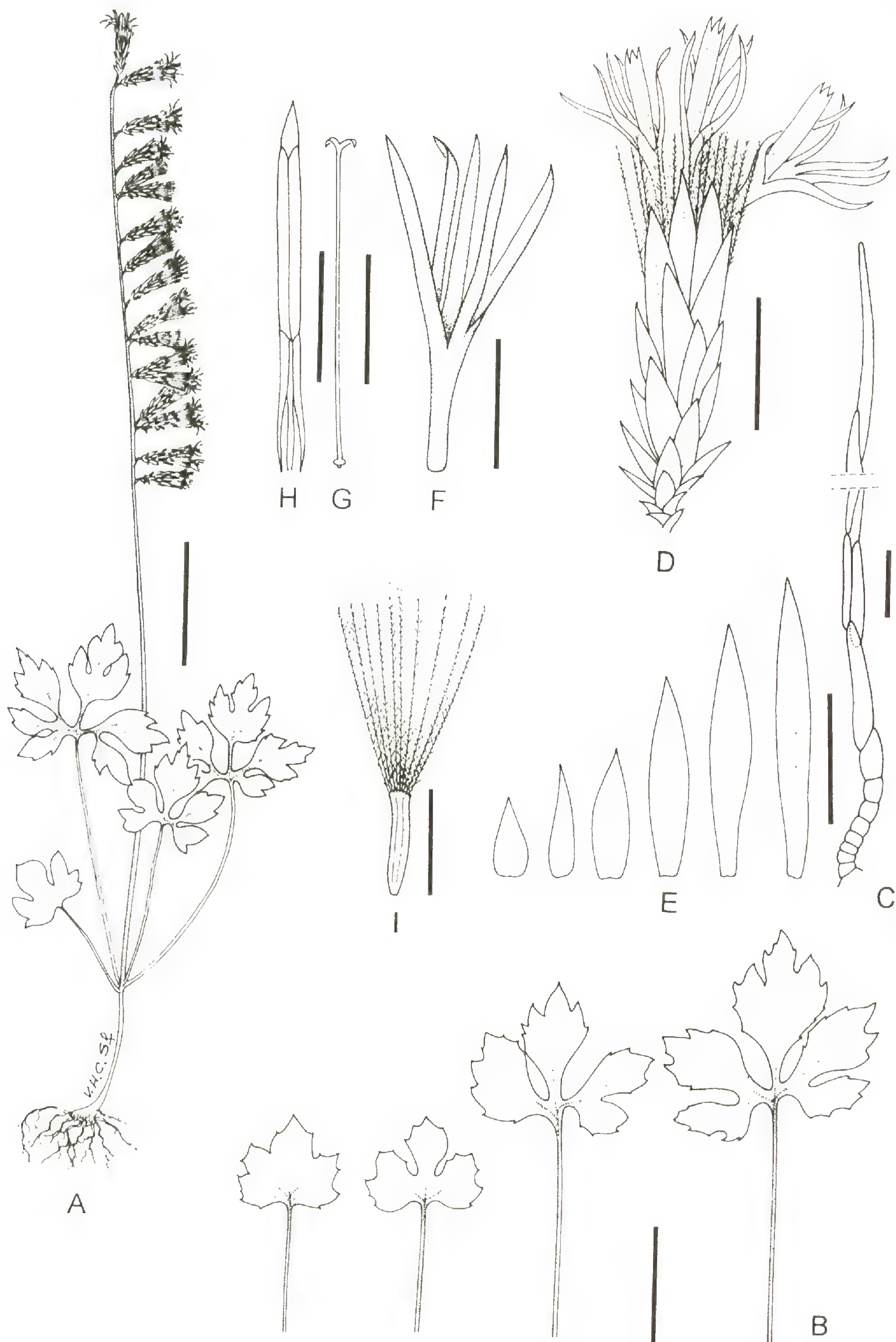


Figure 48. *Ainsliaea dissecta* Franch. & Sav. —A. Habit. —B. Leaves from a single plant. —C. Foliar trichome. —D. Capitulum. —E. Phyllaries. —F–I. Chasmogamous floret: F, corolla; G, style; H, stamen; I, achene with pappus. Scale bars: A, B — 3 cm; C = 0.1 mm; D–G, I = 5 mm; H = 2 mm. Drawn from A, C–I, *Furuse* in 29 Sep. 1955 (UC); B, *Konta & Wakabayashi* 357 (AAU).

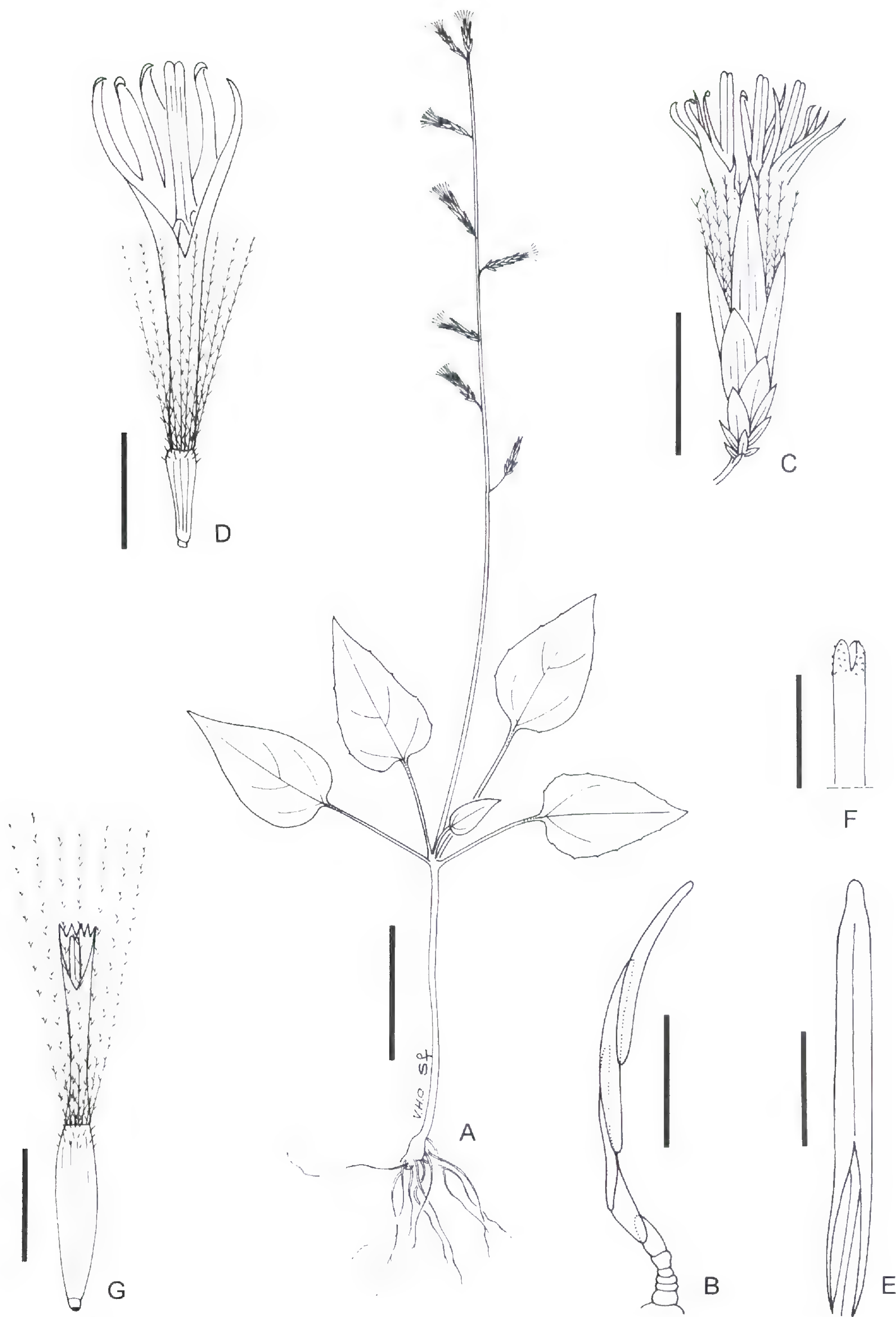


Figure 19. *Ainsliaea gracilis* Franch. —A. Habit. —B. Foliar trichome. —C. Capitulum. —D. Chasmogamous floret. —E. Stamen of chasmogamous floret. —F. Style branches of chasmogamous floret. —G. Cleistogamous floret. Scale bars: A = 3 cm; B = 0.2 mm; C = 5 mm; D, G = 2 mm; E, F = 1 mm. Drawn from A–F, *Sino-Amer. Exped. 1970* (UC); G, *Wilson 1811* (W).

Relationships. *Ainsliaea gracilis* resembles *A. kawakamii*, sharing leaf blades ovate, with the margins obscurely dentate and the achenes glabrous or apically pilose. However, *A. gracilis* may be distinguished by its leaf blades acuminate (vs. obtuse to acute) and purplish green on lower surface (vs. pale green).

Representative specimens examined. CHINA. **Guangdong:** Lian Xian, *P. X. Tan* 59820 (MO). **Guangxi:** Guangxi, *S. Dayao Team* 12856 (MO); "Kwangsi," Na Yan Ts'o, Hsi-chang village & vicinity, Ch'i-fen-shan, Kwei-lin. *W. T. Tsang* 28488 (US); 12 Oct. 1936, *s. coll.* 40018 (MO). **Guizhou:** "Kweichow," Yinkiang, *Y. Tsiang* 7913 (NY). **Hubei:** "Hupeh," *E. H. Wilson* 1811 (NY, W); Western Hubei, *Metasequoia* region of Lichuan Xian (Hsien), vicinity of Lojiaba on the W side of the valley, *B. Bartholomew et al. (Sino-Amer. Exped.)* 1970 (CM, UC), vicinity of Zhuanjiaowan on the E side of the valley, *B. Bartholomew et al. (Sino-Amer. Exped.)* 2041 (UC). **Hunan:** Ma-Ling-Tung, Sinning Hsien, *C. S. Fan & Y. Y. Li* 621 (W). **Locality unknown:** "China," *F. Wei* 1453 (MO); 25 Sep. 1942, *s. coll.* 83689 (MO 04105624); s.d., *s. coll.* 941166 (MO 04199602).

7. *Ainsliaea grossedentata* Franch., *J. Bot. (Morot)* 8(17): 297. 1894. TYPE: China. Sichuan: Sut-chuen oriental, Tchen-keou-tin, 2000 m, *R. P. Farges* 333 (holotype, P not seen; isotype, P!). Figure 50.

Ainsliaea gracilis var. *robusta* Diels, *Bot. Jahrb. Syst.* 29(5): 629. 1901. Syn. nov. TYPE: China. Sichuan: Nanch'uan, Tangai-kuo, 12 Sep. 1891, *C. Bock & A. v. Rosthorn* 877 (type, O!).

Plants perennial, herbaceous, 0.35–0.60 m tall; stems erect, unbranched, naked, glabrous. Leaves clustered above the base, falsely verticillate; longly petiolate, petioles wingless, 2–4.5 cm, flat, glabrous; leaf blades chartaceous, ovate, 2.8–4.5(6) × 2–4(4.5) cm, base subcordate to truncate, apex subobtuse, margins shallowly pinnately lobed to dentate; slightly discolorous, upper surface subglabrous, and lower surface paler, loosely strigose with long straight trichomes; palmate-pinnate, 3-nerved. Capitula subsessile, arranged in a stachyoid inflorescence; peduncles bracteolate; involucre 5- to 6-seriate, 7–8 × ca. 2 mm, cylindrical; phyllaries papyraceous, apically pilose; outer phyllaries ovate, obtuse, ca. 1.5 × 1 mm, inner phyllaries ovate to lanceolate, acute, 3-nerved, 7–8 × ca. 0.5 mm. Florets 3, hermaphrodite, chasmogamous; corolla slightly ligulate, 10–10.5 mm, lobes ca. 4 mm (deeper slit ca. 5 mm), tube 5–5.5 mm, anthers 3–5 mm, apical appendages truncate, ca. 0.5 mm, sagittate; tails ca. 1.2 mm, shortly pilose; style branches obtuse to acute, ca. 0.5 mm. Achenes linear to oblong, ca. 2 mm, 10-nerved, glabrous; pappus bristles ca. 40, ca. 6 mm.

Distribution and phenology. China (Guizhou, Hubei, Sichuan); collected from elevations between 1300 and 2000 m (Fig. 4B); flowering in September.

Discussion. *Ainsliaea gracilis* var. *robusta* is proposed as a new synonym of *A. grossedentata* by its leaf margins shallowly pinnately lobed to dentate (vs. obscurely denticulate in *A. gracilis*). In addition, the differential character mentioned in its protologue, i.e., larger plants, is normal in the specimens cited here.

Vernacular name. Pao chie tsao (*C. Bock & A. V. Rosthorn* 877, O).

Relationships. *Ainsliaea grossedentata* resembles *A. apiculata* from Japan in its leaves and anthers. Both have lobate leaves and rounded anther appendages. However, *A. grossedentata* may be distinguished by its leaf blades shallowly pinnatilobed (vs. palmately lobed) and achenes glabrous (vs. achenes pilose).

Representative specimens examined. CHINA. **Guizhou:** "Kweichow," Niu Tou Shan, Fan Ching Shan, *A. N. Steward et al.* 418 (NY, S, US). **Hubei:** "W Hupeh," *E. H. Wilson* 2743 (NY, W); "Hupeh," *A. Henry* 6637A (US). **Sichuan:** "Sut chuen oriental, Tchen kéou tin" [Chengkou], s.d., *R. P. Farges s.n.* (US 2492364).

8. *Ainsliaea kawakamii* Hayata, *Icon. Pl. Formos.* 8: 72. 1919. TYPE: China. Taiwan: Formosa, *T. Kawakami s.n.* (holotype, TI not seen; isotype, TI photo LP!). Figure 51.

Ainsliaea hui Diels ex Mattf., *Notizbl. Bot. Gart. Berlin-Dahlem* 11: 109. 1931. Syn. nov. TYPE: China. Zhejiang: Tschekiang, Hangchow, Drageon, 14 Oct. 1927, *R. C. Ching* 3861 (type, W!).

Plants perennial, herbaceous, 0.20–0.70 m tall; stems many or single, erect, unbranched (occasionally few branched at the base of the inflorescence), naked. Leaves clustered, 4–5 cm above stem base or crowded near the midpoint of stem, long-petiolate; petioles wingless, (2.5)3.5–8.5 mm; leaf blades ovate, chartaceous, 5–7(9.5) × 3–6 cm, apex obtuse, base rounded or slightly cordate to truncate, margins slightly entire to denticulate; upper surface subglabrous, lower surface paler, with few long straight trichomes; palmate-pinnate, 3-nerved. Capitula short-pedunculate, arranged in a stachyoid inflorescence; involucre 6- to 7-seriate, campanulate-cylindrical, 10–13 × ca. 3 mm; phyllaries subcoriaceous, glabrous, sparsely pilose above; outer phyllaries ovate, obtuse, ca. 2.5 × 1.2 mm; inner phyllaries linear, acute, 3-nerved, ca. 7.5 × 1 mm. Florets 3, hermaphrodite, usually chasmogamous (occasionally cleistogamous in the single plant), corollas white; *chasmogamous* florets with corollas ligulate, ca. 13 mm, lobes ca. 6.5 mm (deeper slit ca. 8 mm), tube ca. 5 mm; anthers purple,

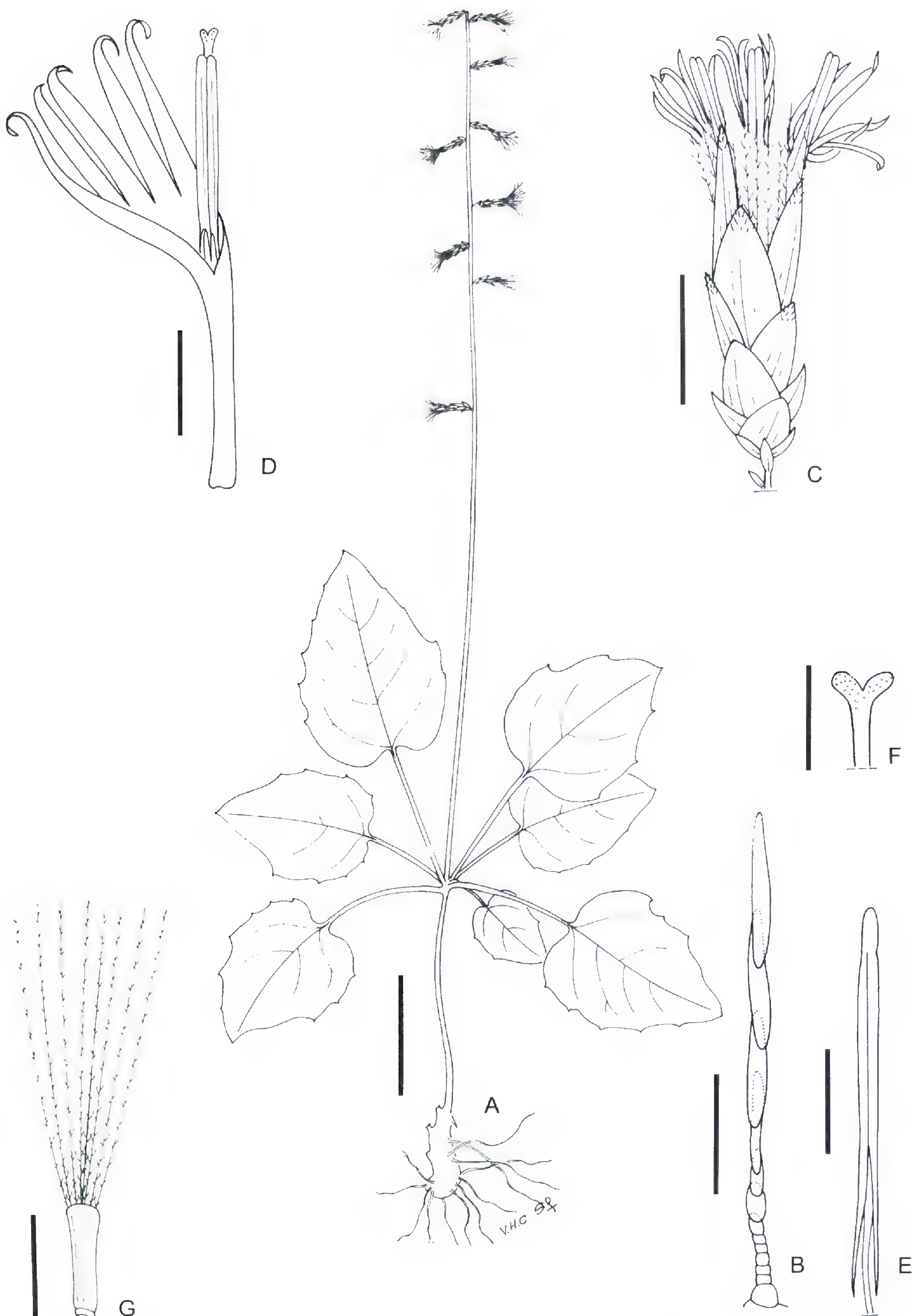


Figure 50. *Ainsliaea grossedentata* Franch. —A. Habit. —B. Foliar trichome. —C. Capitulum. —D. Chasmogamous floret without pappus and ovary. —E. Stamen. —F. Style branches. —G. Achene with pappus. Scale bars: A = 3 cm; B = 0.2 mm; C = 4 mm; D, G = 2 mm; E, F = 1 mm. Drawn from *Farges s.n.* (US).



Figure 51. *Ainsliaea kawakamii* Hayata. —A. Habit. —B. Foliar trichome. —C. Capitulum. —D, F. Cleistogamous floret: D, corolla; F, achene with pappus. —E, G–I. Chasmogamous floret: E, floret without pappus and ovary; G, achene with pappus; H, style branches; I, stamen. Scale bars: A = 3 cm; B = 0.1 mm; C = 5 mm; D = 2 mm; E–G = 5 mm; H = 1 mm; I = 1.5 mm. Drawn from A, the photo of type *Kawakami s.n.* (TI); B, *Ching 2459* (UC); C, E, G–I, *Fang 39* (MO); D, F, *Li 0317* (MO).

ca. 6 mm, apical appendages truncate, ca. 1 mm, sagittate; tails ca. 1.5 mm, shortly pilose; style branches short, rounded, ca. 0.3 mm. Achenes oblong, ca. 2.5 mm, glabrous or pilose above, 10-nerved; pappus bristles 40 to 43, ca. 8 mm; *cleistogamous florets* with corollas tubulose to pseudoligulate, ca. 4.5 mm, 5-lobed, lobes ca. 0.4 mm (deeper slit ca. 1 mm); anthers much reduced, ca. 2 mm; style

branches ca. 0.4 mm. Achenes ca. 6 mm; pappus bristles ca. 9 mm.

Distribution and phenology. China (Anhui, Fujian, Guangdong, Hunan, Zhejiang) and Taiwan. It was collected in woods, on slopes between 600 and 1550 m (Fig. 6A); flowering from September to November (flower buds in June and August).

Observations of the type material. The type material cited in the original diagnosis of *Ainsliaea hui* Diels ex Mattf. corresponds (in locality and date) to that deposited at W, except in the collector number, i.e., “3896” (original diagnosis) instead of “3861” (specimen at W). It is probable that this was a printing error.

Discussion. The original diagnosis of *Ainsliaea kawakamii* mentions achenes as pilose. In contrast, all specimens assigned there (including materials with immature capitula, e.g., *Ching* 2459, *Steward* 7163) have achenes glabrous or apically pilose only. I was not able to see the type material at TI (only its photo) in order to confirm the original diagnosis. However, other characters, such as the leaf blades ovate or ovate to deltoid, rounded to truncate at the base and obtuse at the apex, with leaf margins entire to slightly denticulate, are considered diagnostic for the species. Although *A. kawakamii* was said to have pilose achenes and *A. hui* has apically pilose achenes, since no other diagnostic character that can separate them as distinct taxa was found, *A. hui* is proposed as a new synonym of *A. kawakamii*.

Relationships. *Ainsliaea kawakamii* resembles *A. gracilis*, with ovate leaf blades, margins either entire or slightly denticulate, and the achenes glabrous or apically pilose. *Ainsliaea kawakamii* may be distinguished by its leaf blades acute to obtuse at the apex (vs. acuminate) and paler green below (vs. purplish green).

Representative specimens examined. CHINA. **Anhui:** “Anhui,” Huang Shan, R. C. *Ching* 4133, herb. 8524 (UC); “Kuan Sze-Wang Shan,” A. N. *Steward* 1292, herb. 7163 (UC, US). **Fujian:** Nanping, G. He 4125 (MO). **Guangdong:** Canton, L. Deng 6306 (MO); Canton, L. Deng 1449 (MO), G. Ding & G. Shi 1087 (MO); Canton, X. P. Gao 53659 (MO); Canton, Z. Li 317 (MO); Ruyuan, C. Wang 12244 (MO). **Hunan:** S. Q. Chen 2693 (MO). **Zhejiang:** southern Chekiang, region of King Yuan, R. C. *Ching* 2459 (NY, UC, US); Hangzhou, Fang 38 (MO), Fang 39 (MO); Zhejiang, S. Y. Ho 7190 (MO); Hangzhou, Y. Jin 382 (MO); Chekiang, Lien-Tsi-Shan, Y. L. Keng 1019 (paratype of *Ainsliaea hui*, UC); Tien-mu-shan, K. Yoa et al. 79344 (CM). TAIWAN. Hsinchu Co., Wutzushan, K. C. Yang 791 (CM). **Locality unknown.** Z. Liu 28894 (MO); X. Liu 25245 (MO); Z. Wei 120645 (MO); s. coll. 40304 (PE 26505).

- 9. *Ainsliaea linearis*** Makino, Bot. Mag. 23(275): 250. 1909 (20 Dec. 1909). TYPE: Japan. Kyushu. Kagoshima: Osumi, Yakushima, Onaida, 10 Dec. 1956, M. Togasi 1448 (neotype, designated here, MO; duplicates, CM!, NY!, S!, TNS not seen, UC!, US!, W!). Figure 52.

Ainsliaea fauriana Beauverd, Bull. Soc. Bot. Genève, Sér. 2: 381. 1909. TYPE: Japan. Kyushu. Kagoshima: Ya-

kushima, Liukiu, “in petrosis torrentium,” July 1900, U. Faurie 4065 (type, KYO!).

Plants perennial, herbaceous, 0.10–0.3(0.50) m tall; stems 1 to many, erect, unbranched (occasionally branched above the leaves), loosely strigose. Leaves clustered at the median part of the stem, long-petiolate, petioles narrowly winged, subglabrous, 1–3 cm; leaf blades chartaceous, linear to elliptic, 2.5–5.5 × 0.3–0.8 cm, gradually attenuated at the base, acute mucronate at the apex, margins slightly crenate, revolute, with 4 to 8 teeth on each side; obscurely palmati-pinnate, apparently 1-nerved (midvein prominent); slightly discoloured, subglabrous on both surfaces, with long straight trichomes. Capitula short-pedunculate, arranged in thyrsoïd inflorescence; peduncles 1–4 mm, bracteolate, the upper bracteoles transitioning to involucre bracts or phyllaries; involucre 5- or 6-seriate, cylindrical, 7–10 × 1.5–2 mm; phyllaries papyraceous, margins membranous, obtuse and mucronate at the apex, usually purpur-escence toward the tip, glabrous, 3- to 5-nerved; outer phyllaries ovate, ca. 2 × 0.8 mm; inner phyllaries linear to elliptic or linear, 6–7 × 0.5–1.2 mm wide. Florets 3(5), hermaphrodite, chasmogamous; corolla white, ligulate, 6–8.5 mm, 5-lobed, lobes ca. 1.5 mm (deeper slit ca. 2.5 mm), tube 3–5 mm; anthers ca. 2.5 mm, apical appendages emarginate, ca. 0.5 mm, tails ca. 1 mm, shortly pilose; style branches rounded, ca. 0.5 mm long. Achenes linear-oblong, 2–4 mm, 10-nerved, densely pubescent; pappus bristles ca. 40, 5–6(10) mm.

Distribution and phenology. Japan (Yakushima); collected from mossy sites in forests, along streams, and among rocks of stream beds below high water line, at elevations between 350 and 1400 m (Fig. 5B); flowering from August to October and in December.

Discussion. The type designated in the protologue of *Ainsliaea linearis*, “Prov. Osumi: Yaku-shima (T. Makino! Sept. 1909),” has not been found at KYO, MAK, or TI, where the original herbarium of Makino should be, and no illustration was published with the name. The collection M. Togasi 1448 kept at MO, which is a widely distributed collection (duplicates seen at CM, NY, S, TNS, UC, US, W) and agrees in all respects with the protologue of *A. linearis*, is here chosen as the neotype.

Vernacular name. Hosoba-haguma (Makino, 1909; Masamune, 1934; Kitamura, 1965).

Relationships. *Ainsliaea linearis* is closely related to *A. walkeri* from China in its habit and capitula. Both species have verticillate leaves, leaf blades that are linear to elliptic, with narrowly alate petioles and capitula arranged in spiciform panicles. *Ainsliaea*



Figure 52. *Ainsliaea linearis* Makino. —A. Habit. —B. Foliar trichome. —C. Leaf. —D. Phyllaries. —E. Capitulum. —F–I. Chasmogamous floret: F, achene with pappus; G, corolla; H, stamen; I, style branches. Scale bars: A = 3 cm; B = 0.1 mm; C = 1 cm; D, F, G = 2 mm; E = 5 mm; H, I = 1 mm. Drawn from the type *Togasi 1448* (US).

linearis may be distinguished by its leaf margins that are crenate with four to eight teeth on each side (vs. margins with only one or two teeth on each side toward the apex).

Representative specimens examined. JAPAN. Kyushu. **Kagoshima:** Isl. Yakushima, Yaku-cho, downstream from Yodoko Hut along the Yodoko River, *D. E. Boufford & S. Mitsuta 20062* (CM); Isl. Yakushima, en route from Yodogoya Hut to Onoaida along Onoaida Path, *K. Iwatsuki et al. 113* (CANB); Yakushima, *G. Masamune in 1927* (NY); Isl. Yakushima, along point R-A-B-C, in Hanayama reserved forest, near My. Yakéminé, Yaku-choh, along trail, *S. Mitsuta & H. Doei 411* (TI); Isl. Yakushima, Osumi Gunto, Tachudake, Jigyosho, *R. Moran 5322* (UC); Isl. Yakushima, along Hirase Forestry Road, N slope of Mt. Yoshida-dake, *G. Murata et al. 15480* (AAU); Isl. Yakushima, around Sempiro Waterfall, along Tainokawa River, *G. Murata et al. 15716* (TI); Isl. Yakushima, prope Miyanoura, *Tagawa & Motozi 1970* (NY).

10. *Ainsliaea macroclinidioides* Hayata, J. Coll. Sci. Imp. Univ. Tokyo 25, 19: 141. 1908. TYPE: Taiwan. Suizan, 7702 ft., Oct. 1905, *Nagasawa 665* (lectotype, designated here, TI not seen; duplicate, TI photo LP!). Figure 53.

Ainsliaea okinawensis Hayata, J. Coll. Sci. Imp. Univ. Tokyo 30: 161. 1911. *Ainsliaea macroclinidioides* Hayata var. *okinawensis* (Hayata) Kitam., J. Jap. Bot. 20(4): 192. 1944. TYPE: Japan. Pref. Okinawa, Apr. 1887, *Z. Tashiro s.n.* (holotype, TI not seen; isotype, TI photo LP!).

Ainsliaea ovata Koidz., Bot. Mag. 28: 150. 1914. TYPE: Japan. Pref. Okinawa: Isl. Okinawa, Liukiu, Sep. 1889, *Tashiro s.n.* (holotype, TI not seen; isotype, TI photo LP!).

Ainsliaea dentata Koidz., Bot. Mag. 28: 149. 1914. TYPE: Japan. Pref. Okinawa: Isl. Okinawa, Liukiu (lectotype, designated here, TI not seen; duplicate, TI photo LP!).

Ainsliaea yadsimae Koidz., Bot. Mag. 28: 149. 1914. TYPE: Japan. Pref. Okinawa: Isl. Okinawa, Liukiu (lectotype, designated here, TI not seen; duplicate, TI photo LP!).

Plants perennial, herbaceous, 0.25–0.80 m tall; stems erect, unbranched, single (occasionally 3 or 4), usually naked, loosely strigose. Leaves clustered at the median part of the stem, long-petiolate; petioles wingless, flat, 3–11 cm; leaf blades chartaceous, ovate to lanceolate or ovate to deltoid, 4.5–13 × 3–11 cm, apex acute or acuminate to longly acuminate, base rounded or slightly to deeply cordate, margins from obscurely dentate to dentate; slightly discolored, upper surface subglabrous, lower surface loosely strigose, with long straight trichomes; palmate-pinnate, 3- to 5-nerved. Capitula short-pedunculate, arranged in a stachyoid inflorescence; peduncles bracteolate, 2–4 mm; involucre 3- or 4(6)-seriate, cylindrical, 9–11 × 3–5 mm, phyllaries papyraceous, glabrous; outer phyllaries broadly ovate, acute, 1.5–2.5 × ca. 1 mm; inner phyllaries oblanceolate, acute, conspic-

uously 3- to 5-nerved, 9–10 × ca. 1.5 mm. Florets 2 or 3, hermaphrodite, chasmogamous; corollas white, ligulate, 9–9.5 mm, lobes 3–3.5 mm (deeper slit ca. 5 mm), tube 4–4.5 mm; anthers ca. 5 mm, apical appendages rounded, ca. 0.5 mm, sagittate; tails ca. 1.5 mm, shortly pilose; style branches short, rounded, ca. 0.4 mm. Achenes oblong-obovate, 3–6 mm, 10-nerved, pilose; pappus bristles 35 to 50, 6–9 mm.

Distribution and phenology. Japan (Ryukyu archipelago) and Taiwan. It was collected in evergreen forests along rivers, from near sea level to ca. 2000 m (Fig 6A); flowering in September, October, and from December to April (flower bud in July and August).

Discussion. Two syntypes are mentioned in the protologue of *Ainsliaea macroclinidioides*, “Suizan, ad 7702 ped. alt., leg. Nagasawa, Oct. 1905, (No. 665)” (TI photo at LP!) and “Kagi: Tappansha, leg. T. Kawakami et U. Mori, Oct. 1906, (No. 1971)” (photo at A!). I propose the material “*Nagasawa 665*,” which presents the most complete plant, as lectotype of *A. macroclinidioides*.

The authors follow the opinion of H. Ohba (pers. comm., 23 Apr. 2002) in the selection of the lectotypes for *Ainsliaea dentata* and *A. yadsimae*.

Numerous specific taxa have been proposed to account for the variability that occurs around *Ainsliaea macroclinidioides* (see synonymy). *Ainsliaea ovata* was described on the basis of its ovate leaves that were deeply to slightly cordate at the base, with denticulate leaf margins. *Ainsliaea dentata* was based on its ovate leaves that were rounded at the base, with dentate leaf margins. *Ainsliaea yadsimae* was said to be differentiated by its ovate leaves that were rounded at the base, with slightly dentate leaf margins, and *A. okinawensis* on the basis of its ovate leaves, acuminate at the apex and cordate to rounded at the base, with slightly denticulate leaf margins. However, subsequent collections have shown these leaf characters to be within the range of variation for the species.

Ainsliaea macroclinidioides is treated here as a polymorphic species, with leaf blades varying from lanceolate to deltoid, long-acuminate to acuminate at the apex, with rounded to deeply cordate bases, and margins dentate to obscurely dentate.

Vernacular names. Okinawa-haguma (Koidzumi, 1914), Oh-Okinawahaguma (Koidzumi, 1914), Maruba-haguma (Koidzumi, 1914), Nakahara-haguma (Kitamura, 1944), Okinawa teishoso (*Tetsuo Amano 6903*, KYO).

Representative specimens examined. JAPAN. Ryukyu. **Okinawa:** Isl. Amami-Oshima, *S. Kawagoe in 1919* (US); Loochoo curve, *H. Ohba in 1924* (KYO). **Isl. Iheyajima,** Mt. Gayo, *T. Amano 7485* (KYO). **Isl. Iriomote,** Mt. Goza, *K. Iwatsuki et al. 517* (MO); Yaeyama-gun,



Figure 53. *Ainsliaea macroclinidioides* Hayata. —A. Habit. —B–D. Leaves from different specimens showing the variation in the leaf blades. —E. Foliar trichome. —F. Capitulum. —G. Chasmogamous floret without pappus and ovary. —H. Style branches. —I. Stamen. —J. Achene with pappus. Scale bars: A–D = 3 cm; E = 0.2 mm; F = 5 mm; G, J = 2 mm; H, I = 1 mm. Drawn from B, photo of type *A. macroclinidioides* Hayata, Nagasawa 665 (TI); A, E–J, Iwatsuki et al. 15 (KYO); C, Kanashiro 23 (KYO); D, Murata 17066 (AAU).

Taketomi-cho, the upper part of Kakara river, *M. Kato et al.* 151 (KYO); upper stream of Urauchigawa, *N. Kurosaki* 5676 (KYO); Yaeyama-gun, the upper area of Urauchi river Taketomi-cho, *H. Okada et al.* 235 (KYO); near Urauchigawa, *H. Koyama et al.* 237 (KYO); S side of Mt. Goza-dake, *M. Tagawa & K. Iwatsuki* 4655 (KYO); Iriomote-jima, Ootomi Riv. Urauchigawa, *Y. Tateishi & G. Murata* 4770 (TI). **Isl. Irumti**, *G. Koidzumi in 1923* (KYO). **Isl. Ishigaki**, Kabira, *T. Amano* 6903 (KYO); Mt. Omoto, *K. Iwatsuki et al.* 556 (KYO); Mt. Omoto-dake, *G. Murata* 17066 (AAU). **Isl. Kumejima**, *S. Tawada* 39 (KYO). **Isl. Okinawa**, Kunigami, Onna-dake, *T. Amano* 6874 (KYO, UC, US); near summit of Ishakawa Take, *J. T. Conover* 2830 (US); Kunigami-gun, Mt. Yonaha, *K. Iwatsuki et al.* 15 (KYO, TI); Kunigami, Pueblo Hanechi, Mt. Tanyu, *T. Kanashiro* 23 (KYO); Ohgimi-son, *T. Kanashiro* 2004 (KYO, US); Mt. Genka, *K. Miyagi in 1911* (KYO); Kunigami, s.d., *K. Miyasato s.n.* (KYO); Mt. Taniudake, *T. Naito in 1927* (US); Kunigami, *S. Sakaguchi in 1922* (KYO); Mt. Hennoki, *S. Sonohara* 642 (KYO); Kunigami, Hendona, s.d., *S. Sonohara s.n.* (KYO); Kunigami, Tanyu-dake, *S. Sonohara et al.* 6286 (KYO, US); Insl. Uchina, Kunigami, Pueblo Satefukin, *S. Sonohara in 1922* (KYO); Mt. Okuno, *Z. Tashiro in 1924* (KYO); Mt. Sate, *Z. Tashiro in 1923* (KYO); Kunigami, Pueblo Kunigami, *S. Tawada* 29 (KYO); Motobu Peninsula, foot of Mt. Awa, *E. H. Walker* 7631 (US). **Isl. Tanegashima**, Nishino omote, *s. coll.* 11 (KYO). **Is. Tokara**, Isl. Akuseki, *S. Sako* 6216 (KYO). TAIWAN. Taipei Hsien Co., forest to N. Cha Tien Mt., San Hsie, *T. H. Hsieh & C. H. Hsiao in 1988* (NY); Chiayi Co., Funchihu, *S. F. Huang* 2588 (MO); Mt. Niitaka, *R. Kanehira & S. Sasaki* 21765 (UC, US); Kagi, Tappanasha, *T. Kawakamii & U. Mori* 1971 (paratype of *A. macroclinidioides*, TI not seen; TI photo A!).

11. *Ainsliaea oblonga* Koidz., Bot. Mag. (Tokyo) 28(329): 150. 1914. *Ainsliaea macroclinidioides* var. *oblonga* (Koidz.) Hatus., Flora of the Ryukyu: 607. 1975. TYPE: Japan. Yaeyama archipelago, insl. Nisiomotesima, Aug. 1889. *Tashiro s.n.* (holotype, TI not seen; isotype, TI photo LP!). Figure 54.

Plants perennial, herbaceous, 0.25–0.35 m tall; stems erect, simple or branched above the leaves, subglabrous. Leaves clustered at the midpoint of the stem, long-petiolate; petioles wingless, flat, glabrous, 2–6 cm; leaf blades chartaceous, lanceolate, base attenuate to cuneate; slightly discoloured, upper surface deep green, subglabrous, and lower surface paler, loosely strigose with long straight trichomes; palmate-pinnate, 3-nerved. Capitula shortly pedunculate, arranged in thyrsoïd inflorescence; peduncles bracteolate, with upper bracts transitioning to involucre, 2–4 mm; involucre 6- or 7-seriate, ca. 10 × 3.5 mm, cylindrical; phyllaries papyraceous, glabrous; outer phyllaries ovate, acute, ca. 1.2 × 0.8 mm; inner phyllaries linear to lanceolate, acute, 3-nerved, ca. 9 × 0.8 mm. Florets 3, hermaphrodite, chasmogamous; corolla ligulate, 9–9.5 mm, lobes 3.5–4 mm (deeper slit ca. 5 mm), tube 4–4.5 mm; anthers ca. 4 mm, apical appendages rounded to truncate, ca.

0.7 mm, sagittate; tails ca. 1 mm, shortly pilose; style branches rounded to truncate, ca. 0.7 mm. Achenes oblong to elliptic, ca. 5.5 mm, 10-nerved, densely pilose; pappus bristles ca. 36, ca. 7 mm.

Distribution. China (Guangdong, Guangxi) and Japan (Ryukyu Islands) (Fig. 6B).

Key to the varieties of Ainsliaea oblonga in China and Japan

- 1a. Leaf margins obscurely denticulate; leaf blades lanceolate, acute to acuminate at the apex 11a. var. *oblonga*
- 1b. Leaf margins dentate; leaf blades broadly lanceolate, acute at the apex 11b. var. *latifolia*

11a. *Ainsliaea oblonga* Koidz. var. ***oblonga***. Figure 54A–G.

Leaf blades 3–8 × 1–2(2.5) cm, acute to acuminate at the apex, leaf margins obscurely denticulate.

Distribution and phenology. China (Guangdong, Guangxi) and Japan (Yaeyama archipelago); collected in flower in October and January, in flower bud in August and September.

Vernacular names. Hosoba-haguma (Koidzumi, 1914), Nagaba-haguma (*Elliott* 1104, US).

Relationships. *Ainsliaea oblonga* var. *oblonga* resembles *A. trinervis* from China in its habit and capitula. Both taxa have verticillate leaves, leaf blades that are trinerved, and pedunculate capitula. *Ainsliaea oblonga* var. *oblonga* may be distinguished by its lanceolate leaf blades, ca. 1–2(2.5) cm wide (vs. narrowly lanceolate, ca. 0.5–1.3 cm wide).

Representative specimens examined. CHINA. **Guangdong:** *s. coll.* 6207 (MO); Canton, Mt. Kabi, *s. coll.* 89755 (MO). **Guangxi:** “Kiangsi,” Sai Hang Cheung, Kiennan District, *S. K. Lau* 4041 (US). **Locality unknown:** *s. coll.* 55769 (MO). JAPAN. Ryukyu. **Okinawa:** Taira-ku, Kushi Son; Kunigami-Gun, Okinawa-Shima, *J. C. Elliott* 1104 (US).

11b. *Ainsliaea oblonga* Koidz. var. ***latifolia*** Kitam., J. Jap. Bot. 14: 302. 1938. *Ainsliaea macroclinidioides* var. *latifolia* (Kitam.) Hatus., Flora of the Ryukyu: 607. 1975. TYPE: Japan. Kagoshima Prefecture: Insl. Amami-oshima, Mt. Yuwan, Yuwandake, Nov. 1925, *H. Ohba* (holotype, KYO not seen; isotype, KYO photo LP!). Figure 54H.

Leaf blades 8–11 × 3.5–4.5 cm, subobtuse to acute at the apex. Leaf margins dentate.

Distribution and phenology. At present it is only known from the type collection from Amami-oshima Island; flowering in November.

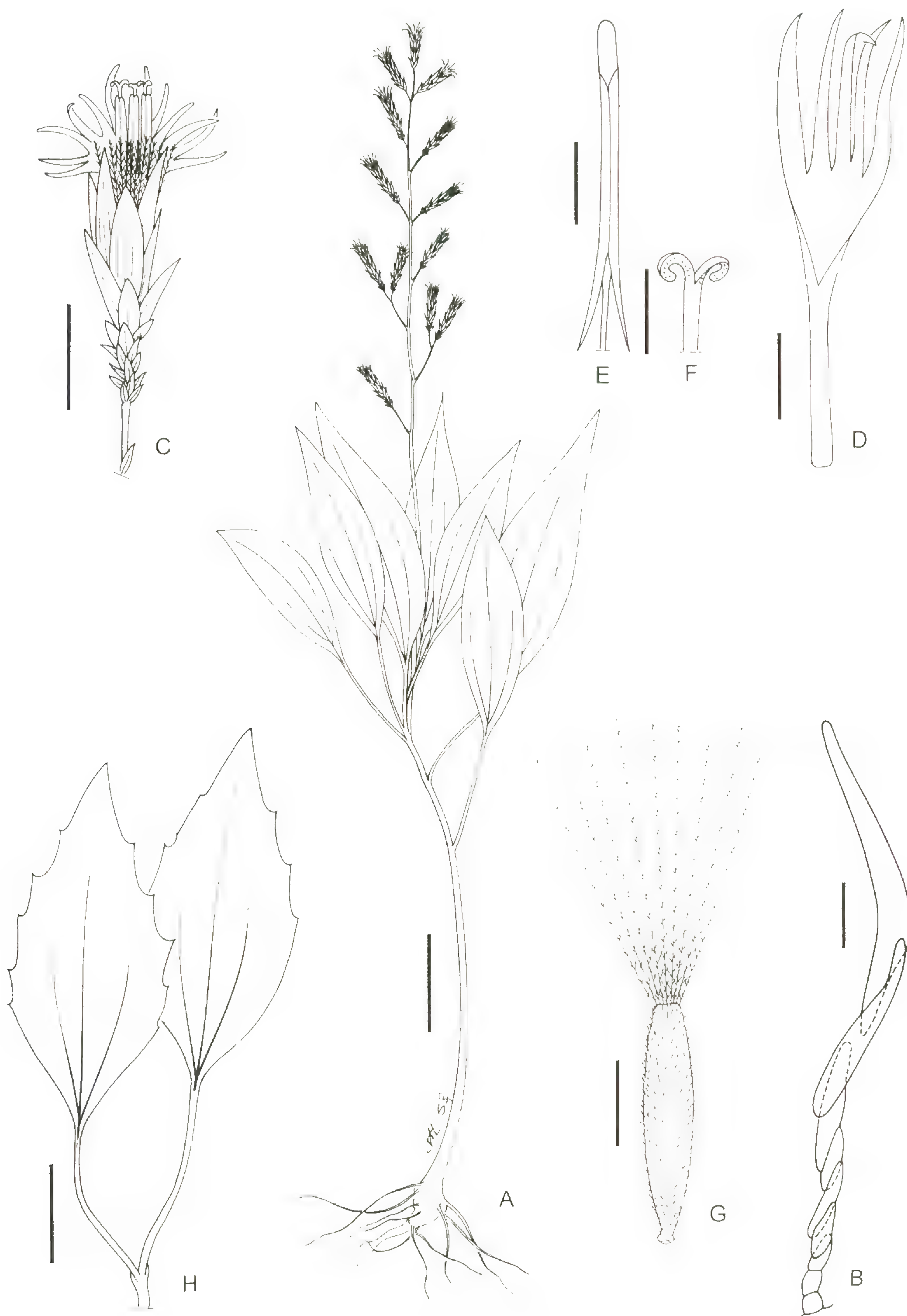


Figure 54. *Ainsliaea oblonga* Koidz. A–G. *A. oblonga* var. *oblonga*. —A. Habit. —B. Foliar trichome. —C. Capitulum. —D–G. Chasmogamous floret: D, corolla; E, stamen; F, style branches; G, achene with pappus. —H. *A. oblonga* var. *latifolia* Kitam. Leaves. Scale bars: A, H = 3 cm; B = 0.1 mm; C = 5 mm; D, G = 2 mm; E, F = 1 mm. Drawn from Elliott 1140 (U.S.).

Relationships. The var. *latifolia* resembles *Ainsliaea macroclinidioides* in its leaves with dentate margins. *Ainsliaea oblonga* var. *latifolia* may be distinguished by its leaf blades that are broadly elliptic (vs. ovate to deltoid or ovate to lanceolate) and attenuate at the base (vs. rounded to slightly cordate).

- 12. *Ainsliaea parvifolia*** Merr., Philipp. J. Sci. 12: 110. 1917. TYPE: China. Guangdong: Loh Fau Mountain (Lofaushan), 28 Oct. 1916, *E. D. Merrill* 10237 (holotype, US!). Figure 55.

Plants perennial, herbaceous, 0.11–0.25 m tall; stems erect, unbranched, naked, sparsely strigose. Leaves basally clustered, rosulate, long-petiolate; petioles wingless, 2–5 cm, flat, strigose, leaf blades subcoriaceous, ovate or oblong to ovate, $2\text{--}3.5 \times 1.5\text{--}2$ cm, apex acute-mucronate, base abruptly rounded, then cuneately narrowed into the petiole, margins denticulate; adaxial surface subglabrous, abaxial surface moderately strigose, with long straight trichomes; palmate-pinnate, 3-nerved. Capitula short-pedunculate, arranged in a stachyoid inflorescence; peduncles with minute bracteoles, 1–3 mm; involucre 5- or 6-seriate, narrowly campanulate, $8\text{--}10 \times$ ca. 4 mm; phyllaries subcoriaceous, dull purple, glabrous; outer phyllaries ovate, obtuse, $1\text{--}2 \times$ ca. 1 mm; inner phyllaries linear to elliptic, acute, 3-nerved, ca. 10×1 mm. Florets 3, hermaphrodite, chasmogamous; corollas white, ligulate, lobes 4–6 mm (deeper slit 0.5–1 mm), tube 4.5–5 mm; anthers ca. 5 mm, apical appendages truncate, ca. 0.7 mm, sagittate; tails ca. 1.5 mm, smooth to slightly pilose; style branches shortly bilobate, rounded, ca. 0.3 mm. Achenes oblong to obovate, ca. 2 mm, 10-nerved, apically pilose; pappus bristles ca. 40, 6.5–8 mm.

Distribution and phenology. At present it is known only from the type collection from Lofaushan; found on open grassy slopes between 500 and 1000 m; flowering in October.

Relationships. *Ainsliaea parvifolia* exhibits some likeness to *A. yunnanensis* in its habit and capitula. Both species have leaves long-petiolate, with leaf blades that are ovate and cuneate at the base, and the capitula sessile. *Ainsliaea parvifolia* is distinguished by its foliar trichomes, i.e., straight trichomes (vs. T-shaped trichomes), and its achenes apically pilose (vs. pilose).

- 13. *Ainsliaea trinervis*** Y. C. Tseng, Acta Phytotax. Sin. 31(4): 367. 1993. TYPE: China. Guangxi: Rongshui, *S. Q. Chen* 16409 (holotype, IBSC not seen; isotypes, TI not seen, TI photo LP!). Figure 56.

Plants perennial, herbaceous, 0.30–0.60 m tall; stems erect, unbranched, loosely strigose. Leaves clustered at the median part of the stem, petiolate, petioles wingless, flat, pilose, 1–1.5 cm; leaf blades chartaceous, lanceolate, $5\text{--}9 \times 0.5\text{--}1.3$ cm, base attenuate, slightly decurrent into the petiole, longly acuminate at the apex, margins denticulate; subglabrous on both surfaces with long straight trichomes; palmate-pinnate, 3-nerved. Capitula pedunculate, arranged in thyrsoid inflorescence; peduncles 3–5 mm, pilose; involucre 6- or 7-seriate, cylindrical, $10\text{--}12 \times 2\text{--}4$ mm; phyllaries papyraceous; outer phyllaries ovate, acute, $1\text{--}3 \times 0.8\text{--}1.3$ mm, apex pilose; inner phyllaries ovate to lanceolate or narrowly elliptic, acute, 3- to 5-nerved, $10\text{--}12 \times 1.5\text{--}2$ mm, glabrous. Florets 3, hermaphrodite, chasmogamous; corolla purple, ligulate, ca. 9.5 mm, lobes ca. 4 mm (deeper slit 4.5 mm), tube ca. 5 mm; anthers ca. 5 mm, apical appendages slightly emarginate, ca. 0.5 mm; tails ca. 1.5 mm, pilose; style branches short, truncate, ca. 0.5 mm. Achenes oblong, ca. 3 mm, 10-nerved, densely pilose; pappus bristles 36 to 38, ca. 7 mm.

Distribution and phenology. China (Guangdong, Guangxi, Guizhou), collected on stony mountain places, in dense trees; fruiting in November, flowering collection without month.

Relationships. *Ainsliaea trinervis* resembles *A. walkeri* in its habit and capitula. Both species have verticillate leaves clustered near the midpoint of stems, leaf blades that are elliptic, and the capitula paniculate. *Ainsliaea trinervis* may be distinguished by its leaf blades 3-nerved (vs. 1-nerved), longly acuminate at the apex (vs. obtuse to acute), margins uniformly denticulate (vs. with only one or two teeth on each side toward the apex), and wingless petioles (vs. narrowly alate).

Representative specimens examined. CHINA. **Guangdong:** Renhua, *L. Deng* 7582 (paratype, MO); Ruyuan County, *X. Liu* 28990 (MO). **Guangxi:** Damiao Mt., Antai district, Xiaosang village (hill Yuanbao), *S. Q. Chen* 17037 (MO); Rongshui, *S. Q. Chen* 16610 (paratype, MO), 14449 (paratype, IBSC not seen); Longsheng, *S. L. Yu* 700527 (paratype, IBSC not seen), *Exped. Longsheng* 50095, 50175 (paratypes, IBSC not seen). **Guizhou:** Rongjiang, *Exped. Qiannan* 3261 (paratype, IBSC not seen).

- 14. *Ainsliaea walkeri*** Hook. f., Bot. Mag. 102: tab. 6225. 1876. TYPE: China. Guangdong: Hong Kong, Dec. 1875, *Capt. A. L. Wilkes* s.n. (holotype, K!). Figure 57.

Plants perennial, herbaceous, 0.15–0.35 m tall; stems erect, unbranched below the inflorescence, scarcely strigose. Leaves clustered at the median part of the stem, petiolate, petioles narrowly winged,

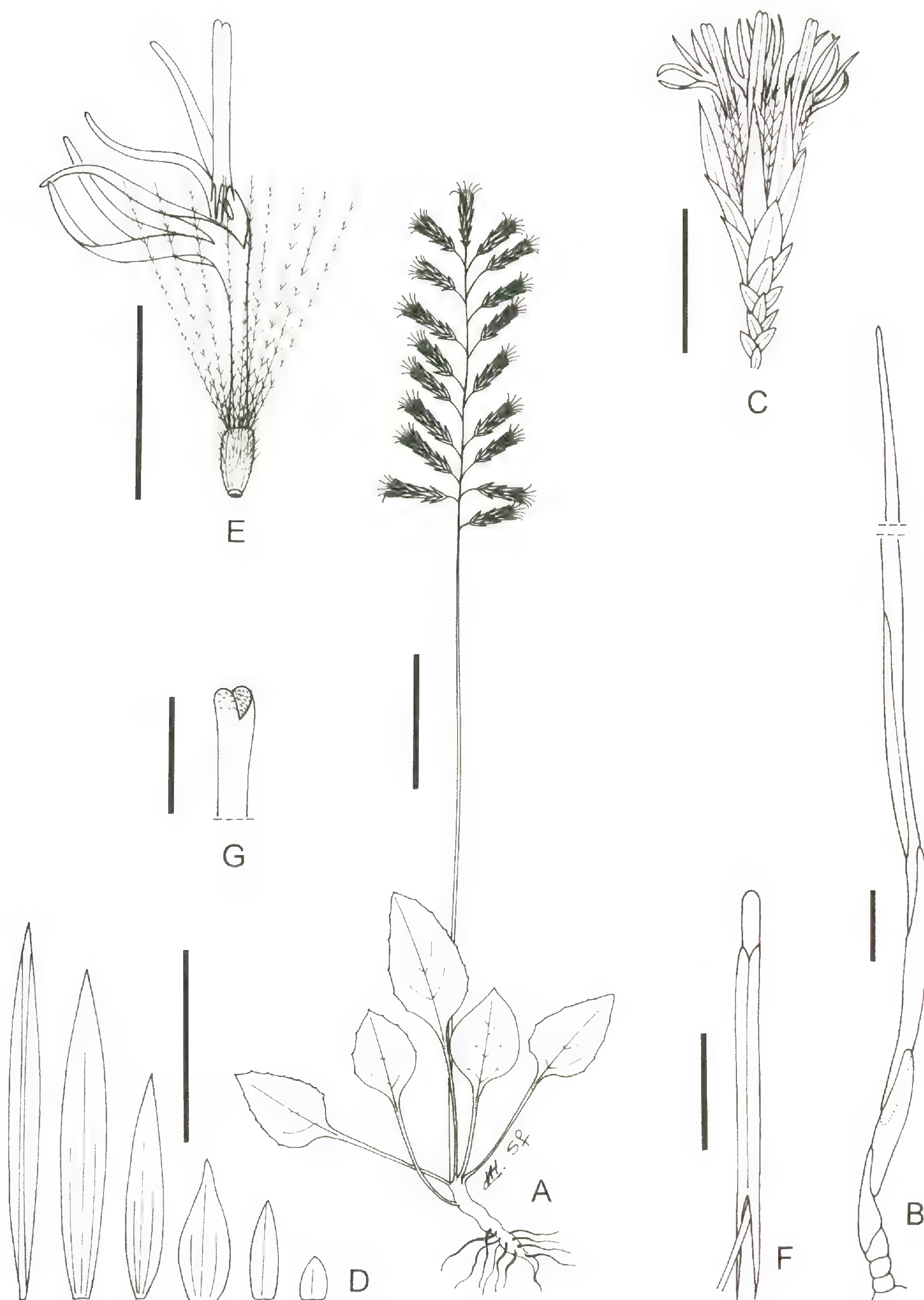


Figure 55. *Ainsliaea parvifolia* Merr. —A. Habit. —B. Foliar trichome. —C. Capitulum. —D. Phyllaries. —E. Chasmogamous floret. —F. Stamen. —G. Style branches. Scale bars: A = 3 cm; B = 0.1 mm; C–E = 5 mm; F = 1.5 mm; G = 1 mm. Drawn from the holotype Merrill 10237 (US).



Figure 56. *Ainsliaea trinervis* Y. C. Tseng. —A. Habit. —B. Foliar trichome. —C. Capitulum. —D. Phyllaries. —E. Chasmogamous floret. —F. Stamen. —G. Style branches. Scale bars: A = 3 cm; B = 0.2 mm; C = 5 mm; D, E = 4 mm; F, G = 1 mm. Drawn from the paratype *Chen 16610* (MO).

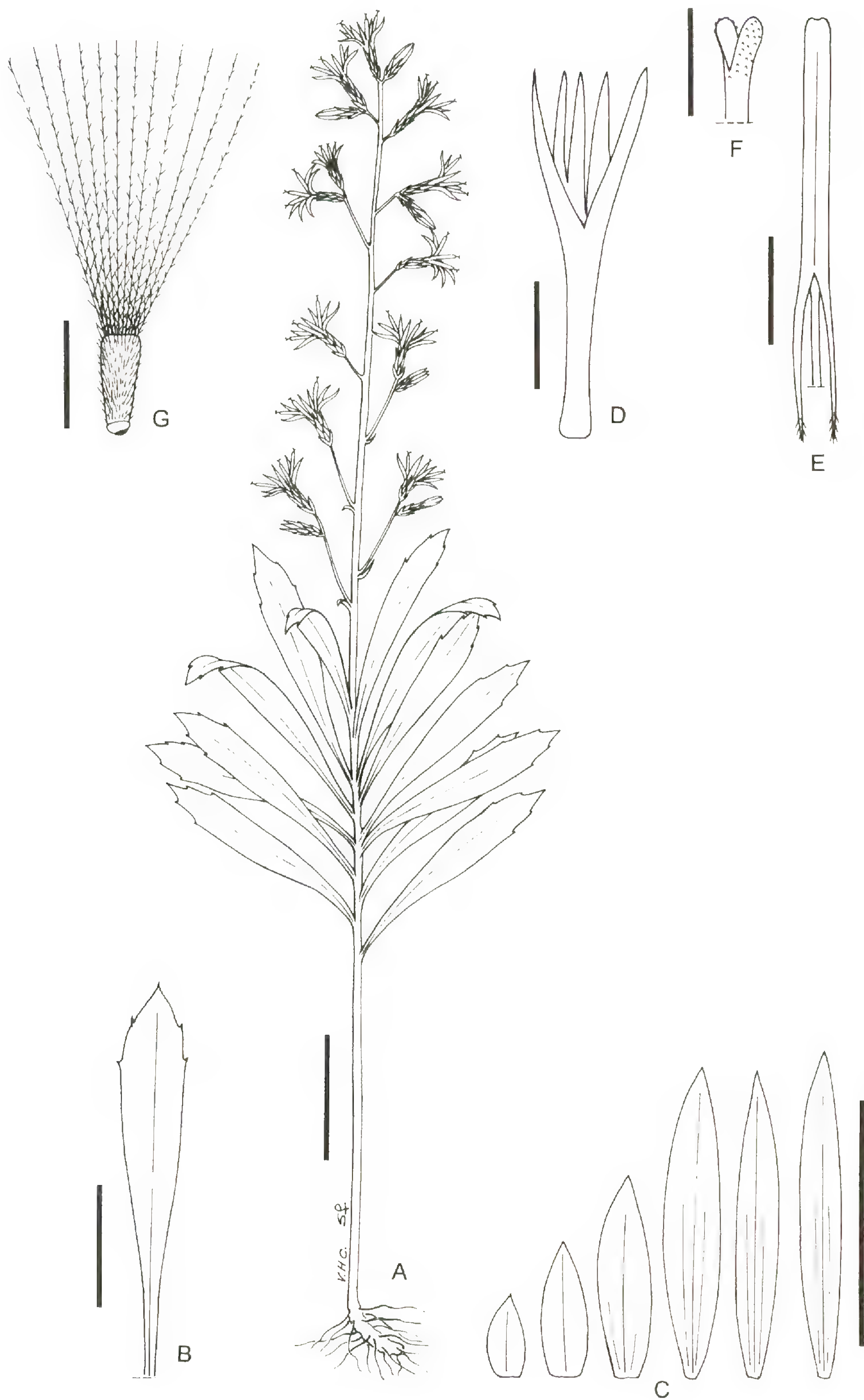


Figure 57. *Ainsliaea walkeri* Hook. f. —A. Habit. —B. Leaf. —C. Phyllaries. —D–G. Chasmogamous floret: D, corolla; E, stamen; F, style branches; G, achene with pappus. Scale bars: A = 3 cm; B = 2 mm; C = 6 mm; D, G = 2 mm; E, F = 1 mm. Drawn from Tsang 24542 (MO).

glabrous, 0.5–1.3 cm; leaf blades chartaceous, linear to elliptic, $(2.5)3.5\text{--}5.5 \times 0.4\text{--}0.9$ cm, gradually attenuated into the petiole, acute and mucronate at the apex, margins slightly revolute, with 1 or 2 mucronate teeth on each side toward the apex; slightly discolored, glabrous on both surfaces; pinnate, apparently 1-nerved. Capitula short-pedunculate to subsessile, arranged in thyrsoid inflorescence; peduncles sparsely bracteolate, with upper bracteoles transitioning to the involucre, 1–3 mm; involucre 6- or 7-seriate, cylindrical, $7\text{--}10 \times 3\text{--}3.5$ mm; phyllaries papyraceous, glabrous; outer phyllaries ovate, acute, $2\text{--}3 \times 0.8\text{--}1.3$ mm; inner phyllaries linear to elliptic, acute, 3- to 5-nerved, $6.5\text{--}8 \times 0.7\text{--}1$ mm. Florets (2)3, hermaphrodite, chasmogamous; corolla white, fragrant, ligulate, 4.5–7.5 mm, lobes ca. 1.5 mm (deeper slit ca. 3), tube 1.5–4 mm; anthers purple, 4–5 mm, apical appendages emarginate, ca. 0.5 mm; tails 1–1.5 mm, shortly pilose; style branches truncate, 0.4–0.5 mm. Achenes oblong, 1–2 mm, densely pilose; pappus bristles ca. 34, ca. 6 mm.

Distribution and phenology. China (Guangdong, Guangxi), collected on shaded wet cliffs and swampy thickets at ca. 600 m; flowering in October and December.

Relationships. *Ainsliaea walkeri* resembles *A. trinervis* in habit. Both species are from China, have verticillate leaves, and narrow leaf blades. *Ainsliaea walkeri* may be distinguished by its leaf margins with only one or two mucronate teeth on each side above (vs. uniformly denticulate).

Representative specimens examined. CHINA. **Guangxi:** Sh-feng, Dar Shan, S Nanning, R. C. Ching 8158 (NY, W), R. C. Ching 8246 (NY, UC); Kwangtung border, Shang-sze district, SE of Shang-sze, Shap Man Taai Shan, Tang Lung Village, W. T. Tsang 24495 (MO, NY), Nam She Village, W. T. Tsang 24542 (MO, NY, US), W. T. Tsang 24807 (MO, NY).

NAMES OF DUBIOUS IDENTITY

Ainsliaea asperrima (D. Don) Sch. Bip., Jahresber. Pollichia 20–21: 407. 1863. Basionym: *Hieracium asperrimum* D. Don, Pr. Fl. Nepal.: 165. 1825. TYPE: Nepal. Wallich s.n. (K, not seen).

The protologue of *Hieracium asperrimum* D. Don includes the collection “Nepal, Wallich s.n.” without any reference to flower characters. I was unable to find any material of this exsiccata either in K, where Wallich collections are deposited, or in BM, BR, E, G, GH, L, NY, or S, where duplicates are probably kept. I found a specimen, “India, Khasia, Griffith s.n., distr. by Lemann 274,” at P, wrongly marked as the isotype of *Ainsliaea asperrima* (D. Don) Sch. Bip. This

collection was cited by Schultz Bipontinus (1863: 407) when he transferred *H. asperrimum* to the genus *Ainsliaea*. Although this collection seems to correspond to *A. asperrima* according to the original diagnosis (i.e., “foliis lanceolatis ... sinuoso-dentatis ...”), it lacks capitula and cannot be positively identified as a species of *Ainsliaea*. For this reason, until the type of Don’s name is located or materials can be provided, the identity of *A. asperrima* is uncertain.

Ainsliaea × *hybrida* Sugimoto, J. Jap. Bot. 32(2): 63. 1957. TYPE: Japan. Kiushu, Insl. Yakushima, 13 Aug. 1956, J. Sugimoto s.n. (TI, not seen)

Ainsliaea mollis Diels ex H. Limpr., in Limpr., Feddes Repert. Beih. 12: 514. 1922. TYPE: China. Sichuan: “Szechuan,” Lu ting tschian am Tung ho, zwischen Gan gou und Wu li gou, 2000 m, H. Limpricht 1613 (B, not seen).

The name *Ainsliaea mollis* was mentioned by Tseng (1996) in *Flora Republicae Popularis Sinicae*. However, because I was unable to see the type specimen and I have seen no other material which can be assigned to this species, the identity of *A. mollis* is not clear.

NAMES ADDED IN PROOF

The following eight names in *Ainsliaea* were reported by Chuang (H. Chuang in H. Peng. 2004. Addenda. Fl. Yunnan. 13: 833–835) in treating *Ainsliaea* for the *Flora Yunnanica*. I have not yet seen the type specimens for these names and their taxonomic identity is not confirmed.

Ainsliaea angustifolia Hook. f. et Thoms. ex C. B. Clarke var. *luchunensis* H. Chuang

Ainsliaea fulvioides H. Chuang

Ainsliaea fulvioides H. Chuang var. *glabriachenia* H. Chuang

Ainsliaea gongshanensis H. Chuang

Ainsliaea henryi Diels var. *daguanensis* H. Chuang

Ainsliaea latifolia (D. Don) Sch. Bip. var. *ramifera* H. Chuang

Ainsliaea lijiangensis H. Chuang

Ainsliaea pingbianensis Y. C. Tseng var. *malipoensis* H. Chuang

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APPENDIX 1

List of accepted species of *Ainsliaea*. Numbering of species applies to Appendices 1 and 2 only.

1. *Ainsliaea acerifolia* Sch. Bip.
 - 1a. *A. acerifolia* var. *acerifolia*
 - 1b. *A. acerifolia* var. *subapoda* Nakai
2. *A. angustata* C. C. Chang
3. *A. apiculata* Sch. Bip.
 - 3a. *A. apiculata* var. *apiculata*
 - 3b. *A. apiculata* var. *acerifolia* Masam.
 - 3c. *A. apiculata* var. *ovatifolia* Masam.
4. *A. aptera* DC.
5. *A. apteroides* (C. C. Chang) Y. C. Tseng
6. *A. bonatii* Beauverd
 - 6a. *A. bonatii* var. *bonatii*
 - 6b. *A. bonatii* var. *multibracteata* (Mattf.) S. E. Freire
7. *A. brandisiana* Kurz
8. *A. caesia* Hand.-Mazz.
9. *A. cavaleriei* H. Lév.
10. *A. chapaensis* Merr.
11. *A. cordifolia* Franch. & Sav.
12. *A. crassifolia* C. C. Chang
13. *A. dissecta* Franch. & Sav.
14. *A. elegans* Hemsl.
 - 14a. *A. elegans* var. *elegans*
 - 14b. *A. elegans* var. *strigosa* Mattf.
15. *A. foliosa* Hand.-Mazz.
16. *A. fragrans* Champ. ex Benth.
17. *A. fulvipes* Jeffrey & W. W. Sm.
18. *A. glabra* Hemsl.
 - 18a. *A. glabra* var. *glabra*
 - 18b. *A. glabra* var. *sutchuenensis* (Franch.) S. E. Freire
19. *A. glumacea* (Fr.) Sch. Bip.
20. *A. gracilis* Franch.
21. *A. grossedentata* Franch.

22. *A. henryi* Diels
22a. *A. henryi* var. *henryi*
22b. *A. henryi* var. *subalpina* (Hand.-Mazz.) S. E. Freire
23. *A. hypoleuca* Diels ex H. Limpr.
24. *A. kawakamii* Hayata
25. *A. lancangensis* Y. Y. Qian
26. *A. latifolia* (D. Don) Sch. Bip.
26a. *A. latifolia* var. *latifolia*
26b. *A. latifolia* var. *taiwanensis* S. E. Freire
27. *A. linearis* Makino
28. *A. macrocephala* (Mattf.) Y. C. Tseng
29. *A. macroclinidioides* Hayata
30. *A. mairei* H. Lév.
31. *A. nana* Y. C. Tseng
32. *A. nervosa* Franch.
33. *A. oblonga* Koidz.
33a. *A. oblonga* var. *oblonga*
33b. *A. oblonga* var. *latifolia* Kitam.
34. *A. parifolia* Merr.
35. *A. paucicapitata* Hayata
36. *A. pentaflorea* S. E. Freire
37. *A. pertyoides* Franch.
37a. *A. pertyoides* var. *pertyoides*
37b. *A. pertyoides* var. *albotomentosa* Beauverd
38. *A. pingbianensis* Y. C. Tseng
39. *A. qianiana* S. E. Freire
40. *A. ramosa* Hemsl.
41. *A. reflexa* Merr.
42. *A. rubrinervis* C. C. Chang
43. *A. smithii* Mattf.
44. *A. spanocephala* Y. C. Tseng
45. *A. spicata* Variot
46. *A. trinervis* Y. C. Tseng
47. *A. uniflora* Sch. Bip.
48. *A. walkeri* Hook. f.
49. *A. yunnanensis* Franch.

APPENDIX 2

List of exsiccatae. The number in parentheses refers to the species number in Appendix 1. When collections were made by more than one collector and the numbering system of one collector is used, only that collector is cited.
Amano 6874 (29), 6903 (29), 7485 (29); Anders 11129 (4); Arimoto in 1903 (3a); Averyanov et al. N VII471 (41).
Bangham W. N. & C. M. 1191 (41); Bartlett 6215 (22b); Bartholomew 1532 (4); Bartholomew & Boufford 3878 (4); Bartholomew et al. 1598 (23), 1970 (20), 2041 (20); Bay s.n. (3a); Beusekon & Phengklai 2370 (26a) [type, *A. pteropoda*]; Biskam 43 (26a); Biswas 3508 (4), in 1935 (5); Bock & Rosthorn 773 (22a) [type, *A. undulata*], 877 (21) [type, *A. gracilis* var. *robusta*], 1220 (6a) [type, *A. multibracteata*]; Bodinier 79 (37a) [type, *A. sparsiflora*]; Bodinier 1584 (45); Bodinier & Deblenne 78 (37b) [type, *A. ovalifolia*]; Bodinier & Ducloux 8 (49), in 1897 (23); Boufford & Kato 23362 (1b); Boufford & Mitsuta 20043 (3b), 20062 (27); Boufford & Shimizu 23468 (1b); Boufford & Wood 19871 (1b); Bunchuai 1437 (26a), 1501 (44); Burger s.n. (47); Burger & Zollinger 266 (3a) [type, *A. apiculata*], 272 (1a) [type, *A. acerifolia*], 283 (17) [type, *A. uniflora*].
Cavalerie 19 (37b), 20 (30), 21 (45), 22 (49), 1907 (9) [type, *A. cavaleriei*], 4212 (37b), 7485 (37b); Champion 161 (16) [type, *A. fragrans*]; Chang 0694 (6a); Charette 1525 (3a), 1897 (1b); Chen B. et al. 80 (16); Chen D. 425 (9); Chen H. 2190 (16); Chen N.G. 42854 (16); Chen S. Q. 2693 (24), 14753 (9), 15094 (38), 15486 (17), 6610 (46) [type, *A. trinervis*], 17037 (46), 17243 (9); China Germany Team 1024

(16); Ching 2459 (24), 3861 (24) [type, *A. hui*], 4133 (24), 4463 (16), 8158 (48), 8246 (48); Chiou 042 (37b), 59608 (26a), 60097 (49); Chong 3882 (16); Chow C. L. 1909 (16); Chow H. C. 1978 (16); Chu 2273 (2), 2564 (23), 2564 (23), 3939 (18a); Chuang & Kao 2474 (26b), 2526 p.p. (22b, 41), 4198 (41); Chung B. C. in 1960 (1b); Chung H. H. 2906 (16); Chung I. C. 7080 (1b); Clarke 37392 (45); Clemens 16277 (41), 17256b (41), 18906 (41), in 1925 (41), in 1928 (41); Clifford G. Rice 10-78 (26a); Conover 2830 (29); Cui, S. C. 314 (1b).
David in 1869 (18a) [type, *A. lancifolia*]; Dayao S. Team 12856 (20); de Wilde W. J. J. O. & Wilde-Duyfjes B. E. E. 14245 (41), 15196 (41), 16734 (41); Delavay 607 (6a) [type, *A. pteropoda* var. *platyphylla*], 608 (49) [type, *A. yunnanensis* and *A. pteropoda* var. *leiophylla*], 1218 (37a) [type, *A. pertyoides*], 1921A (45) [type, *A. pteropoda* var. *obovata*], 2313 (37a) [type, *A. pertyoides*], 4939 (32) [type, *A. nervosa*], in 1888 (37b), 12 Jan. 1889 (37b), 28 Jan. 1889 (37a, 37b), Oct. 1889 (49), in 1895 (49); Deng 347 (16), 1449 (24), 6306 (24), 7048 (16), 7582 (46) [type, *A. trinervis*], 8023 (9), 8530 (16), 8878 (9); Dillon Ripley & Ulmer 43 (41), 71 (41); Ding & Shi 1087 (24); Drummond 1846 (4), 20055 (26a), 22635 (4), 25596 (26a); Ducloux 9D (45) [type, *A. spicata*], 253 (6a) [type, *A. bonatii* var. *arachnoidea*], 254 (37b) [type, *A. pertyoides* var. *albotomentosa*], 256 (37a), 295 (37b), 296 (37b) [type, *A. pertyoides* var. *intermedia*], 2271 (37b), 2348 (37b), 2418 (37b), 3646 (6a) [type, *A. bonatii*], 6028 (37b); Dudgeon & Kenoyer 36 (26a); Duthie 12985 (26a), 1739 (4), 19884 (4), 25653 (4).
Ecker 131 (4); Elliott 1104 (33a); Elmer 8363 (41), 14193 (41), 14293 (41); Esquirol 3633 (14a) [type, *A. elegans* var. *tomentosa* and *Pertya esquirolii*], in 1917 (23); Exped. Biolog. Sino-Rossica in 1955 (26b).
Faber 128 (32), 391 (18a) [type, *A. glabra*], in 1885/86 (16); Fan & Li 620 (16), 621 (20); Fang W. P. 1990 (18a), 1996 (18a), 2076 (42) [type, *A. rubrinervis*], 3157 (18a); Fang W. Z. 8017 (16); Fang (24), 39 (24); Farges 333 (21) [type, *A. grossedentata*], 1034 bis (16) [type, *A. rubrifolia*], 1034A (20) [type, *A. gracilis*], 1034B (18b) [type, *A. sutchuenensis*], s.n. (18b, 21); Faurie 409 (1b), 1918 (1b), 1920 (1b), 4065 (27) [type, *A. fauriana*], 4066 (3b) [type, *A. liukiensis*], 4220 (3a), 5451 (1b), 6079 (3a), 6356 (1b), 6611 (3a), 6740 (1b), 11746 (17), in 1900 (3b); Feng K. M. 12964 (14a); Feng Z. 600 (16); Ford s.n. (16); Forrest 5681 (22b) [type, *A. henryi* var. *oratifolia*], 6545 (28) [type, *A. pteropoda* var. *macrocephala*], 7862 (17) [type, *A. fulvipes*], 7865 (45), 11070 (12) [type, *A. crassifolia*]; Foxworthy 2400 (41); Fukasawa in 1910 (16); Furuse 28 Sep. 1955 (1b), 29 Sep. 1955 (13), Nov. 1955 p.p. (3a, 3b), July 1956 (1b), Sep. 1956 (1b), 7 Oct. 1956 (11) [type, *A. cordifolia*], 9 Oct. 1956 (47), Sep. 1957 (1b), 27 Oct. 1957 (3a), 28 Oct. 1957 (13), Sep. 1958 (1b), 24 Oct. 1958 (1b, 3a), Nov. 1958 (11), in 1959 (1b), in 1960 (3a), 22 Sep. 1961 (1b), 30 Sep. 1961 (3a), Oct. 1961 (47), in 1961 (3a).
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Kamini in 1961 (4); Kanai 655 (3a); Kanashiro 23 (29), 2004 (29); Kanehira 3051 (22b) [topotype, *A. elegans* Hayata], 21194 (22b), 2945 (22b); Kanehira & Sasaki 21644 (41), 21765 (29); Kapoort 75623 (45); Kato et al. 151 (29); Kawagoe in 1917 (3a), in 1919 (29); Kazmi in 1965 (4); Keng H. K1214 (41); Keng Y. L. 1019 (24) [type, *A. hui*]; Kingdon Ward 447 (26a), 17086 (26a), 18260 (26a); Kings in 1897 (19); Kirat in 1926 (26a), in 1932 (26a); Kirino 356 (3a), 392 (1b); Kitamura in 1932 (3b); Kobayashi 12864 (1b), 12921 (1b), 12982 (3a), 13627 (1b), 14195 (1b), 15072 (3a), 15169 (3a), 15174 (3a), 15175 (3a), 15188 (1b), 16547 (3a); Koelz 129 (4), 3168 (4), 1789 (4), 7410 (4), 10517 (26a), 20156? (4), 27006 (26a); Koerper s.n. (26b); Koidzumi in 1921 (3b, 3c), in 1923 (29); Kollhoff 218 (16); Konta & Wakabayashi 357 (13); Koyama 2678 (3a); Koyama & Phengklai T-39997 (26a); Koyama et al. 237 (29), T-30524 (26a), T-31605 (44), T-31642 (44), T-33435 (26b), T-33444 (26a), 33699 (44) [type, *A. spanocephala*]; Koyama 8643 (41); Kuntze 3280 (3a), 6695 (26a), 6956 (4) [type, *A. aptera* f. *paniculata*]; Kurosaki 5676 (29); Kurz 865 (7) [type, *A. brandisiana*].

Lau S. K. 4041 (33a), 4554 (9); Lau Y. K. 111 (16); Lee I. K. in 1957 (1b); Lee Y. N. & Lee Y. S. 709 (1b); Li M. K. 0724 (45); Li Z. 317 (24), 716 (16), 2031 (16); Li Z. Y. et al. 326 (22a); Liang (?not clear) B. Z. 83655 (16); Limpricht 1251 (23) [type, *A. hypoleuca*]; Lin & Yen 348 (41); Linsley Gressitt 195 (41); Liu S. L. 890169 (16); Liu X. 24979 (17), 25245 (24), 28990 (46); Liu Y. S. 1748 (16), 2325 (32); Liu Z. 28894 (24); Liu Z. Y. 15451 (18b); Lobb 447 (41) [type, *A. reflexa* var. *lobbiana*]; Loher 3621 (41), 6474 (41), 14045 (41); Lu & Wei 20097 (9).

Mackinnon s.n. (26a); Maire 102 (37b), 352 (37b), 919 (49), 920 (6a), 921 (30), 1084 (37b), 2349 (6a), 2401 (37b), 2517 (37b), 2529 (39) [type, *A. qianiana*], 2529 (49), 3155 (23), 3155B (23), 3225 (45), 3936 (30), 3917 (49), Nov. 1912 (30) [type, *A. mairei*], W7135 (45), W7224 (49), W7225 (18a), W7227 (26a), W7228 (45), W7229 (23), W7231 (23), W16887 (37b); Malaise 158 (26a), 186 (26a); Manberg 684 (22b) [type, *A. henryi* var. *ovatifolia*]; Maruo in 1913 (11) [type, *A. maruoi*]; Masamune in 1922 (3a), in 1927 (27); Maser 118 (4); Masumura in 1931 (22b); Mauri in 1921 (26a); Maximowicz 13147 (3a), in 1863 (3a), in 1863 (1a), in 1863 (47); McClure 459 (9) [type, *A. cleistogama*], 16069

(41); Mearns 19 (41), 20 (41); Meebold 838 (26a), 6805 (45); Mell 874 (8) [type, *A. caesia*], in 1914 (30); Merrill 734 (41), 835 (41), 4571 (41) [type, *A. reflexa*], 4824 (41), 10230 (16), 10237 (34) [type, *A. parvifolia*]; Miki et al. 56 (1b); Mimoro et al. 4117 (47), 4197 (47), 5454 (47); Mitsuta & Doei 411 (27); Miyagi in 1911 (29); Miyasato s.n. (29); Mizushima 12738 (1b), 13199 (3b); Mohindar Nath 11 (4); Moran 4722 (1b), 5322 (27), 5333 p.p. (3a, 3c); Muramatsu in 1935 (3b) [type, *A. apiculata* var. *acerifolia*]; Murata 10486 (23), 17066 (29), 41060 (13), 45392 (1b); Murata Koyama 41255 (1b); Murata & Shimizu 1530 (1b); Murata & Tabata 418 (3c) [type, *A. apiculata* var. *ovatifolia*]; Murata et al. 150 (1b), 15480 (27), 15716 (27), T-15998 (26b).

Nagasawa et al. in 1905 (22b) [type, *A. elegans* Hayata]; Naito in 1927 (29b); Narita in 1910 (16) [type, *A. cordifolia* var. *integrifolia*]; Nicolson 2955 (26a); Niyomdham & Vidal 438 (44).

Ohashi et al. 708054 (1b); Ohba in 1924 (29); Okada et al. 235 (29).

Panigrahi 4798 (19), 6184 (26a), 19832 (19); Parot 51434 (19); Pételot 417 (36) [type, *A. pentaflorea*], 1452 (23), 1767 (41) [type, *A. tonkinensis*], 2067 (41), 2068 (10) [type, *A. chapaensis*], 2082 (23) [type, *A. petelotii*], 3680 (41), 3724 (14b) [type, *A. elegans* var. *strigosa*], 4551 (36), 4552 (23) [type, *A. petelotii*]; Prain 23896 (26a).

Qian 3343 (25) [type, *A. qianiana*]; Quisumbing & Sulit 6240 (41).

Raince & Kessliz in 1886 (1b); Raizada in 1937 (4); Ramos & Edaño 37614 (41), 40191 (41), 40469 (41), 44917 (41); Rock 4072 (37a), 4216 (41), 5628 (28) [type, *A. pteropoda* var. *macrocephala*], 5773 (28) [type, *A. pteropoda* var. *macrocephala*], 6679 (6a), 6937 (49), 7284 (17), 17427 (5); Royle in 1833 (4) [type, *A. aptera*], s.n. (26a) [type, *A. pteropoda*].

Saito et al. in 1975 (1b); Sakaguchi in 1922 (29); Sako 6216 (29); Santos 32047 (41); Sasaki in 1919 (3b); Sastry 41016 (19); Sata in 1932 (3b); Satomi in 1957 (11); Satomi 14467 (1b), 15301 (3a); Sawson 15337 (4); Schlagintweit Cat. N° 391, 1/30 Oct. 1855 (19) [type, *A. glumacea* Klatt], Cat. N° 10864, 15/18 Nov. 1856 (19), Cat. N° 11960, 10–14 Feb. 1857 (19); Schneider 2328 (28) [type, *A. pteropoda* var. *macrocephala*]; Seto 30054 (47); Sharp s.n. (4); Shi 15077 (9); Shimizu 13558 (1b), 20394 (22b); Shimizu & Kozima 33 (3b); Shoma & Takahashi in 1974 (1b); Shoma et al. in 1970 (47); Si Bocca Rahmat 10132 (41), 10451 (41); Simond 30405 (26a); Sin 181 (18b) [type, *A. plantaginifolia*]; Singh 12786 (26a); Singh & Jalan in 1960 (4); Si Toroes Rahmat 615 (41) [type, *A. longipetiolata*]; Smith 4698 (43) [type, *A. smithii*], 4745 (6b) [type, *A. matfeldiana*], 12120 (15) [type, *A. foliosa*]; Smitinand in 1982 (44); Smitinand & Anderson 7323 (26a); Smitinand & Alsterlund 6695 (26a); Smitinand et al. 10299 (26a); Sonohara s.n. (29), 642 (29), in 1922 (29); Sonohara et al. 6286 (29); Steward A. N. 1292 (24); Steward A. N. & Cheo 1090 (9); Steward A. N. et al. 418 (21); Stewart R. R. 5203 (4), 6836 (4), 13506 (4), 10100B (4), 15787 (26a), 17166 (4), 27535 (4), in 1978 (4); Stolitzka in 1864 (4a, 26a); Sugaya et al. in 1952 (1b); Sugimoto 10912 (13) [type, *A. dissecta*]; Sun 1462 (18b); Suzuki 93 (3a), 107 (1b), 141 (3a), 145 (1b), 549 (26b), 1450 (41), 2256 (41), 9513 (26b), in 1928 (22b), July 1929 (41), Aug. 1929 (22b); Suzuki & Kudo in 1928 (41).

Taam 113 (9); Tagawa 557 (1b); Tagawa & Iwatsuki 4655 (29); Tagawa & Motozi 1921 (3b), 1970 (27); Tagawa et al. 1611 (45), T-2866 (26b); Takaata & Kobayashi 575 (1b); Takahashi 1838 (1b); Takaki in 1957 (3a); Takeuchi M. & T. 14 (1b); Tamura 9327 (3a), 21079 (22b); Tamura & Koyama 23261 (22b), 23388 (26b), 23595

(22b), 23729 (26b), 23780 (26b); Tan 59543 (16), 59820 (20), 59863 (16), 60508 (16), 62920 (22a); Tanaka T. 10392 (3b); Tanaka Y. 46 (3a); Tang 5788 (16); Taquet 243 (3a), 1062 (3a); Tashiro in 1910 (16), 6 Aug. 1918 p.p. (3b, 3c), 9 Aug. 1918 p.p. (3a, 3b), in 1923 (29), in 1924 (29); Tawada 29 (29), 39 (29); Tateishi & Murata 4770 (29c); Ten 354 (18a); Teraya 459 p.p. (22b, 41); Togasi 1448 (27) [type, *A. linearis*]; Tsang 20084 (40), 20812 (16), 24495 (48), 24542 (48), 24807 (48), 28488 (20), 28500 (22a); Tsang & Wong 3177-herb 15038 (16); Tsiang 5087 (18a), 7913 (20); Tsugaru et al. 7348 (1b).

Uchida in 1969 (11); Uno 23338 (1b); Utech 98-415 (1b).
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Wagner 6515 (22b), 6516 (26b) [type, *A. latifolia* var. *taiwanensis*]; Walker 7631 (29c); Wallich C-44 (26a), in 1821 (26a); Wand & Zhang 8241 (9); Wang C. 35545 (41), 35546 (41), 40279 (40), 40798 (40), 42244 (24), 44058 (16), 44094 (16); Wang C. W. 82572 (14a); Wang F. T. 22682 (32); Wang Q. W. 83962 (23); Wang W. H. 8078 (18a); Watabiki in 1902 (3a); Wawra 1193 (3a); Wei F. 230 (9), 1453 (20); Wei Z. 120645 (24); Weigold in 1915 (23); Wilkes in 1875 (48) [type, *A. walkeri*]; Williams 1434 (41); Wilson E. A. 183 (6a); Wilson E. H. 1766(18b) [type, *A. tenuicaulis*], 1811 (20), 2159 (22a), 2743 (21); Winit 1344 (26a); Wissmann 184 (49), 230 (49), 411 (49), 425 (6a), 456 (14a), 777 (26a) [type, *A. heterantha*]; Wuyi S. Team 80-0203 (22a).

Yamaguchi & Nagano in 1917 (3a, 3b); Yamazaki 3103 (47); Yang K. C. 1318 (41); Yang H. N. 2039 (3b); Yang K. C. 791 (24); Yoa et al. 79344 (24).

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APPENDIX 3

List of voucher specimens used for outgroup taxa in cladistic analysis.

Macrocladium robustum Maxim. JAPAN. Yokohama: *Dr. Wawra 1527* (NY).

Myriopholis dioica Bunge. CHINA. Peking vic.: *F. T. Wang 20106* (NY).

Pertya ovata Maxim. JAPAN. Honshu. Wakayama: *Takahashi et al. 1387* (MO). Pref. Kyoto, near Yamashiroto, *G. Murata 19177* (NY).

APPENDIX 4

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